Code No: R31016

R10

Set No: 1

III B.Tech. I Semester Regular Examinations, November/December - 2012
TRANSPORTATION ENGINEERING -I
(Civil Engineering)

Time: 3 Hours   **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Briefly outline the highway development in India.
   (b) Explain the necessity and objectives of highway planning?

2. (a) Derive an expression for finding the extra widening required on horizontal curve.
   (b) The stopping sight distance required for a highway is 80m. Find the required set back distance from centre line of a circular curve of radius 300 m assuming the length of the curve is greater than the sight distance.

3. (a) What are the objectives and uses of volume study.
   (b) What are the various types of traffic accidents and explain the various measures to prevent accidents.

4. (a) How are the traffic signal times decided based on Webster's Method.
   (b) A carriage way approaching an intersection is given as 15 m. The entry and exit width at the rotary is 10 m. The traffic approaching the intersection from the four sides is given in the table. Find the capacity of the rotary using the given data.

approach	Left turn	Straight	Right turn
North	408	450	375
South	420	350	370
East	250	500	600
west	400	505	510

5. (a) What are the desirable properties of the bitumen mixes? What are the steps on bituminous mix design? Discuss briefly?
   (b) Explain the CBR and the test procedure for the laboratory and field tests. How are the results of the test obtained and interpreted?

6. The CBR Value of subgrade soil is 5 %. Calculate the total thickness of flexible pavement using design charts developed by IRC.

7. Determine the complete stresses in the pavement for a 53.38 kN dual wheel, tire pressure 517.1 kPa, center to center spacing of duals in 0.33 m.
   (a) Calculate the warping stresses for a 3.70 m wide slab with various lengths, assuming temperature differences to be, day +2 per 25.4 mm of slab thickness to, and night – 1^0C per 25.4 mm of slab thickness. Plot a curve of stress versus distance.
   (b) Calculate the warping stress for various slab widths. Plot a curve of stress versus distance.
   (c) Determine the loading stresses at the edge, and interior of the slab.
   (d) Determine the maximum critical stress (load + temperature) in the concrete, in interior case.

8. (a) Compare the alternate bay and continuous bay methods construction of cement concrete roads
   (b) What are the advantages and drawbacks of cement concrete roads? Explain cement grouted and rolled concrete layers and their uses.

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Code No: R31016

R10

Set No: 2

III B.Tech. I Semester Regular Examinations, November/December - 2012
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 factors affecting the highway alignment.
   (b) What are the different Road Development Plans in India? Discuss them in detail.

2. (a) What are the objects of highway geometric design? List the various geometric elements   to be considered in highway design.
   (b) Calculate the stopping sight distance for a design speed of 100 kmph. Take the total reaction time 2.5 seconds and the coefficient of friction = 0.35.

3. (a) Explain briefly the various aspects investigated during parking studies. What are the uses of these studies?
   (b) What a detailed note on road accidents and its preventive measures.

4. (a) Explain the design steps involved in Rotary intersection.
   (b) The width of approaches for a rotary intersection is 12 m. the entry and exit width at the rotary is 10 m. Table below gives the traffic from the four approaches, traversing the inter section. Find the capacity of the rotary.

approach	Left turn	Straight	Right turn
North	400	700	300
South	350	370	420
East	200	450	550
west	350	500	520

5. (a) Discuss the desirable properties of the bitumen. Compare tar and bitumen.
   (b) The properties of a subgrade soil are given below
   Liquid limit   = 75 %
   Plastic limit = 55 %
   Passing No. 200 sieve = 70 %
   (i)   Determine the group index and classify the soil by HRB soil classification system.
   (ii)   Determine the suitability of the soil as a subgrade material.

6. Find the spacing between the contraction joints for a 3.5 m slab width having a thickness of 22 cm for (a) plain concrete slab (b) R.C.C. slab. The allowable tensile stress values in concrete and steel are 0.8 and 1400 kg/cm^2, coefficient of friction is 1.50.

7. Design the pavement for construction of a new two lane carriageway for design life 15 years using IRC method. The initial traffic in the year of completion in each direction is 150 CVPD and growth rate is 5%. Vehicle damage factor based on axle load survey = 2.5 std axle per commercial vehicle. Design CBR of subgrade soil=4%.

8. (a) How is soil cement base course constructed? Give details
   (b) List out the different methods of road construction. Discuss their advantages and limitations.

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Code No: R31016

R10

Set No: 3

III B.Tech. I Semester Regular Examinations, November/December - 2012
TRANSPORTATION ENGINEERING -I
(Civil Engineering)

Time: 3 Hours
Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Explain the engineering surveys needed for a highway project and data to be collected.
   (b) What is the importance of Nagpur road plan in highway planning of our country? Explain the plan formulae and the salient features of the plan.

2. (a) Explain the ruling, maximum and exceptional gradients.
   (b) The speed of overtaking and overtaken vehicles are 90 Kmph and 45 Kmph respectively on a two way traffic road. If the time taken by the overtaking vehicle is equal to 7.5 seconds and reaction time of the driver is equal to 2 seconds, calculate the safe overtaking sight distance.

3. (a) Write in details about the traffic counting.
   (b) Write the various IRC equivalent factors of vehicles for Rural roads.

4. (a) Explain at grade intersections, the advantages and limitations.
   (b) The 15 minute counts on cross roads 1 and 2 during peak hour are observed as 178 and 142 vehicles per lane respectively approaching the intersection in the direction of heavier traffic flow. If the amber times required are 3 and 2 seconds respectively for two roads based on approach speeds, design the signal timings by trail cycle method. Assume an average time head way of 2.5 seconds during green phase.

5. Explain the plate bearing test procedure and how corrections for 'K' value may be made for a different plate size and for accounting for worst moisture conditions.

6. Estimate the thickness of cement concrete using the method suggested by Indian road congress.

Modulus of elasticity of concrete	$= 3.0 \times 10^5$ kg/cm^2
Modulus of rupture of concrete	$= 40$ kg/cm^2
Poisson's ratio of concrete	$= 0.15$
Modulus of subgrade reaction	$= 6$ kg/cm^2
Wheel load	$= 5100$ kg
Radius of contact pressure	$= 15$ cm

7. (a) Explain the CBR method of pavement design. How is this method useful to determine the thickness of the component of layers.
   (b) Design the pavement for construction of a new bypass with the following data:
   Two lane carriage way, Initial traffic in the year of completion of construction = 400 CVPD (sum of both directions) Traffic growth rate = 7.5 %, Design life = 15 years, Vehicle damage factor based on axle load survey = 2.5 standard axle per commercial vehicle, Design CBR of subgrade soil = 4%.

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Code No: R31016

$\boxed{\textbf{R10}}$ $\boxed{\textbf{Set No: 3}}$

8. (a) Specify the materials required for construction of WBM roads. What are the uses and limitations of this type of road?

(b) Compare the fallowing methods of bituminous road construction

    (i)   Central plant mix and road mix methods

    (ii)   Hot mix and cold mix

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Code No: R31016

R10

Set No: 4

III B.Tech. I Semester Regular Examinations, November/December - 2012
TRANSPORTATION ENGINEERING -I
(Civil Engineering)

Time: 3 Hours
Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks
*****

1. (a) Explain obligatory points? What are the uses of map study in engineering surveys?
   (b) What are the different road network patterns? Explain them in detail with neat sketches.

2. (a) Explain the summit and valley curves and the various cases when these are formed while two different gradients meet.
   (b)The design speed of a highway is 90 Kmph. There is a horizontal curve of radius 190 m on a certain locality. Calculate the super-elevation needed to maintain this speed. If the maximum super-elevation of 0.07 is not to be exceeded, calculate the maximum allowable speed on this horizontal curve as it is not possible to increase the radius. Safe limit of transverse coefficient of friction is 0.15.

3. (a) Discuss briefly the various factors affecting the practical capacity of road.
   (b) What are the various types of traffic marking commonly used? What are the uses of each?

4. (a) What is traffic rotary? What are its advantages and limitations, in particular reference to traffic conditions in India?
   (b) The average normal flow of traffic on cross roads A and B during design period are 400 and 2250 PCU per hour. The saturation flow values on these roads are estimated as 1250 and 1000 PCU per hour respectively. The all red time required for pedestrian crossing is 12 sec. Design two phase traffic signal by Webster's method.

5. (a) What are the tests on aggregates for the highways and explain them clearly?
   (b) What are the various tests carried out on bitumen? Briefly mention the principle and uses of each test,

6. (a) Explain the critical wheel load locations considered in Westergaard's theory? Write the significance of each location in the analysis of load stresses?
   (b) Compute the stresses due to loading at salient locations on a cement concrete slab using Wastergaurd's equations from the below given data.
   Poisson's ratio of concrete = 0.15
   Pavement salb thickness = 22cm
   Modulus of elasticity of concrete 2.77×10^5 kg/cm^2
   Modulus of subgrade reaction = 4.35 kg/cm^3
   Radius of contact of tire = 16 cm
   Wheel load = 4950 kg.

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Code No: R31016

R10

Set No: 4

7. (a) Explain how the sub-base thickness varies in the design of flexible pavements?
   (b) Design the pavement for construction of a new two lane carriageway for design life 15 years using IRC method. The initial traffic in the year of completion in each direction is 150 CVPD and growth rate is 5%. Vehicle damage factor based on axle load survey = 2.5 std axle per commercial vehicle. Design CBR of subgrade soil=4%.

8. (a) Write down the construction steps for water-bound macadam roads.
   (b) What are the various types of bituminous construction in use? Discuss the advantages and limitations of each.

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