6E3036

B. Tech VI Sem. (Main/Back) Exam. May. 2013
Transportation Engg -I 6CE5

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions**, selecting **one question** from **each unit**. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1. _____

2. _____

UNIT – I

Q.1 Give a brief account of the following:

a. Objectives of highway planning process

b. Significance of technological characteristics of transportation systems

c. Salient features of Road Development Plan 2001-2020

d. Comparison of road- rail transportation systems   [4x4=16]

OR

Q.1 a. Compute the length of roads in different categories if the area of the region is 400000 km sq, the number of towns in the region are 200 and number of villages in the region are 40000.   [5]

b. Give complete classification of roads functional in rural and urban areas.   [3+3=6]

c. Overview of surveys that are carried out for fixing a road alignment.   [5]

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OR

Q.5 a. Using Westergaard's formula modified by Kelly, check corner stress for a concrete slab of thickness 30cm if the design wheel load is 10t, tyre pressure is 8kg/cm^2, center to centre distance between two tyres is 30 cm, design period is 20 years, modulus of elasticity is 3×10^5, poisson ratio is 0.15, flexural strength of concrete is 45kg/cm^2 and modulus of subgrade reaction is 8 kg per cm^2 per cm. Define the concept of Equivalent Single Wheel Load (ESWL) and role of wheel configuration in the design of pavements.

For single axle dual wheel, compute the radius of area of contact of wheel using the formula given as: [5+3=8]

$$a = \left[0.8521 \times \frac{P}{q\Pi} + \frac{5}{\Pi}\left(\frac{P}{0.5227q}\right)^{0.5}\right]^{0.5}$$

b. Write a detailed note on type of drainage works that should be carried out in hill roads. Also write a note on road side arboriculture. What varieties may be planted at road side to reduce the effect of noise.   [4+3+1=8]

[6E3036]   Page **4 of 4**   [5320]

UNIT – II

Q.2 a. Discuss the physical significance of the tests, which should be conducted to examine the consistency of bitumen. Write step-by-step testing procedure for finding Aggregate Abrasion Value. [4+4=8]

b. Write construction steps required to construct a cement-concrete road. Give specification of material that should be used in the construction. [5+3=8]

OR

Q.2 a. Give an account of physical tests, listed by Indian Road Congress (IRC) that should be conducted on stone aggregates to examine their properties. Write step-by-step testing procedure that should be followed to find the grade of the bitumen. [4+4=8]

b. Give Salient features of Pradhan Mantri Gram Sadak Yojna (PMGSY). What is the basis of fixing priority in this scheme? [6+2=8]

UNIT – III

Q.3 a. Sketch an ideal layout of a road showing all cross-sectional elements as may be desired in an urban area. Give IRC specifications related to each of the element shown in the sketch. How camber is decided? [3+3+2=8]

b. Compute the value of superelevation to be provided on a horizontal curve of radius 200 m and traversed with a speed of 80 km/h. Write steps of providing superelevation in field. [4+4=8]

OR

Q.3 a. Derive an expression for computing Overtaking Sight Distance (SSD) on a road. Give a layout with offsets for a camber to be provided in a high rainfall area on a two-lane wide road laid with thin bituminous surface. Assume it as parabolic. [5+3=8]

b. What would be the compensated gradient if a road is laid with a grade of 4% and a horizontal curve of radius 300 m? Compute the length of vertical curve that would be formed if a horizontal road section is provided with an upward ramp of 2% and satisfies SSD requirements. Assume design speed as 80 km/h and reaction time as 2.5 s, one-way traffic. [2x3+2=8]

UNIT – IV

Q.4 a. Draw a sketch of a four-legged intersection having two lanes on all the approaches. Show accident spots which would be possible due to traffic flowing in both directions and in one direction only. What are different ways in which results of Origin-Destination survey are presented? [2x3+2]

b. define 30th Hourly Volume and its significance. What is the significance of different percentile speeds? [4+4=8]

OR

Q.4 a. Give an account of different turning maneuvers at an intersection and the way by which such maneuvers are controlled. Define:

(i) Parking accumulation

(ii) Parking turnover

(iii) Progressive signals

(iv) Average Annual Daily Traffic [4+1x4=8]

b. Give a detailed sketch showing specification of a mandatory sign, warning sign and informatory sign. What are different types of road markings used on a multilane highway curved section? [2x3+2=8]

UNIT – V

Q.5 a. Define different layers of a flexible pavement. What should be the minimum CBR value of material used in different layers? What are the critical load conditions in the design of rigid pavements? [3+3+2=8]

b. Write equation of computing Group Index of soil and define its parts. Compute the million standard axle load that would come on a four-lane divided road at the end of the 10th year after opening of road to traffic if the existing traffic is 600 CVD, the construction period is 1.5 years and growth rate of traffic is 8%. Assume vehicle damage factor as 3. [4+4=8]

B. Tech. VI Sem. (Main & Back) Exam. May/June-2014
Civil Engineering
6CE5 Transportation Engineering-I

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks: 24

Instructions to Candidates:-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly.

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1. _____

2. _____

UNIT-I

Q.1 (a) Describe any four characteristics of road transport. [8]

(b) Write salient features (any six) of second twenty year road development plan. [8]

OR

Q.1 (a) Enumerate various factors controlling highway alignment. Also explain any one factor in brief. [2+2=4]

(b) Calculate the total lengths of NH, SH and MDR needed in a district as per second 20-year road development plan (i.e. Bombay Road Plan). The data collected from district are as follows: [6]

(iv) Grade separated intersection.

(v) "3 Es" method for reduction accidents.

(vi) Traffic signals.

(vii) Road markings.

UNIT-V

Q.5 (a) Describe in brief any four factors considered for design of pavements. [6]

(b) Describe C.B.R. method adopted for design of flexible pavements as per IRC:37 guidelines. [10]

OR

Q.5 (a) Describe followings for the alignment of hill roads:

(i) Resisting length of hill road. [2]

(ii) Trace cut for hair pin bends. [2]

(b) Describe any four major points to be considered for road side development and arboriculture. [6]

(c) Write short notes on any 4 of the followings: [8]

(i) Road side drains in hill roads.

(ii) Sub-Surface drainage in hill roads.

(iii) Cross-drainage in hill roads.

(iv) Problems in maintenance of hill roads.

(v) Terrain classification on the basis of cross-slope. [6]

Total area = 18400 km²; Undeveloped area = 4800km²; Developed & agricultural area = 8000 km² [3 x 4=12]

Population Range	No. of towns
< 500	200
500 – 1,000	350
1,000 – 2,000	750
2,000 – 5,000	360
5,000 – 10,000	150
10,000 – 20,000	80
20,000 – 50,000	25
50,000 – 1,00,000	10
>1,00,000	5

UNIT-II

Q.2 (a) List out any four desirable properties of road aggregates. Describe procedure for Los Angeles Abrasion Test for road aggregates. [2+6=8]

(b) Describe the method for construction of WBM road. [8]

OR

Q.2 (a) Write any six major differences in bitumen and tar in tabular form. [6]

(b) Describe the construction steps for premixed Bituminous carpet. Also give the quantity of bitumen required for tack coat, prime coat and pre mix. [8+2=10]

UNIT-III

Q.3 (a) Explain total reaction time of driver by 'PIEV' theory. [6]

(b) The speed of overtaking and overtaken vehicles are 70 and 40 Kmph respectively on a two way traffic road. If the acceleration of overtaking vehicle is 0.99 m/sec²,

(i) Calculate safe overtaking sight distance.

(ii) Find minimum length of overtaking zone.

(iii) Draw a neat sketch of the overtaking zone and show position of sign posts. [4+4+2=10]

OR

Q.3 (a) Derive an expression for finding the stopping sight distance at level and at grade on a highway. [8]

(b) A state highway with design speed 80 Kmph and having pavement width 7.0 m is passing through rolling terrain in heavy rain fall area. It has a horizontal curve of radius 500 m. Design the length of transition curve assuming suitable data. [8]

UNIT-IV

Q.4 (a) Describe traffic volume study. Explain any three objects of traffic volume studies. [1+3=4]

(b) Explain the procedure to measure spot speed by enoscope with diagram. [4+2=6]

(c) Write any six advantages of traffic signals. [6]

OR

Q.4 (a) Write any six causes of accidents. [6]

(b) Explain any five of the followings: [5 x 2=10]

(i) Informatory sign.

(ii) Off street parking.

(iii) Application (any 2) of O & D studies.

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B.Tech.VI Semester(Main/Back) Examination, May-June 2015.

Civil Engineering

6CE5A Transportation Engineering -I

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 24

Instructions to Candidates:

*Attempt any **five** questions, selecting **one** question from **each unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Unit - I

1. a) Explain the role of transportation in the economic and social activities of the country. (6)

   b) Define the highway alignment. Explain the requirement of an ideal highway alignment . Which factors control the alignment of roads? (10)

OR

1. a) What are the significant recommendations of Jaykar committee report? How this helped in road development in India? (6)

   b) Calculate the total length of NH,SH,MDR needed in a district as per second 20-Year road development plan.The data collected from the district are given below -

   Area of a district = 10800 km^2

   Developed and agricultural area = 4100 km^2

   Undeveloped area =2300km^2

Population Range	Number of Towns
Less than 500	450
500-1000	320
1000-2000	120
2000-5000	110

   (10)

5000-10,000	35
10,000-20,000	20
20,000-50,000	10
50,000-1,00,000	6
>1,00,000	2

Unit - II

2. a) What are the various tests for Judging the suitability of road stones? Explain the tests which is used to evaluate the toughness of stone aggregate. **(8)**

   b) Explain the desirable properties of bitumen. Compare tar and Bitumen. **(8)**

OR

2. a) Specify the material required for construction of WBM roads. What are the uses and limitations of WBM roads. **(10)**

   b) What are the different types of joints which are used in construction of cement concrete pavement? **(6)**

Unit - III

3. a) Calculate the length of transition curve and the shift using following data-

   Design speed = 80kmph and radius of circular curve is 300 metre. Allowable rate of introduction of super-elevation is 1 in 150.

   Pavement width including extra widening = 7.5 metre. **(8)**

   b) Define the camber and what is the objective of camber. Discuss the factors on which the amount of camber to be provided depends. What are the recommended range of camber for different types of pavement surfaces? **(8)**

OR

3. a) A state highway passing through a rolling terrain has a horizontal curve of radius equal to the ruling minimum radius. If the design speed is 100kmph.

   i) Calculate minimum sight distance, super elevation, extrawidening and length of transition curve. **(10)**

   ii) Specify the minimum set-back distance from the centre line of the two lane highway on the inner side of the curve upto which the building etc. obstructing vision should not be constructed so that intermediate sight distance is available throughout the circular curve. Assume the length of circular curve greater than sight distance.

   b) Draw the typical cross-section of major district road in embankment and national highway is cutting including width of pavement, roadway and land.**(6)**

Unit - IV

4. a) Explain the various types of intersections with neat sketches. What are the advantages and limitations of unchannelized and channelized intersection in particular reference to traffic condition in India? **(12)**

   b) Define passenger car unit. What are the factors which affects the PCU values? **(4)**

OR

4. a) The average normal flow of traffic on reads A and B during design period are 400 and 250 pcu per hour, the saturations flow values on these roads are estimated as 1250 and 1000 pcu per hour respectively the all real time required for pedestrian crossing is 12 secs. Design two phase traffic signal by webster's method. **(8)**

   b) Write a short notes on the following **(8)**

   i) Trip distribution

   ii) Kerb parking

   iii) Off street parking

   iv) Model split.

Unit - V

5. a) What is the importance of hill road drainage?With the aid of neat sketches, show the surface drainage system for effective drainage and disposal of water **(8)**

   b) Explain ESWL and what is the concept in determination of the equivalent wheel lead? **(8)**

OR

5. a) What are the various methods of flexible pavement design. Explain group index of pavement design. What are the limitations of this method. **(8)**

   b) Calculate the stresses at interior edge and corner regions of a cement concrete pavement using Westergaard's stress equations. Use the following of data :-

   Wheel bad = 5100kg.

   Modulus of elasticity of cement concrete = 3×10^5 kg/cm^2

   Pavement thickness = 18 cm,

   Poisson's ratio of concrete = 0.15

   Modulus of subgrade reaction = 8.5 kg/cm^2

   Radius of contact area = 15cm. **(8)**

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B. Tech. VI-Sem. (Main/Back) Exam., April/May-2016

Civil Engineering

6CE5A Transportation Engineering-I

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks (Main & Back): 26

Instructions to Candidates:-

*Attempt any **five** questions, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly.*

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL   2. NIL

UNIT-I

Q.1 (a) Discuss the role of transportation in national development. [6]

(b) What are the significant recommendations of Jayakar Committee Report? How this helped in road development in India. [10]

OR

Q.1 (a) Compare road transportation with other modes of transportation. [6]

OR

Q.5 (a) Explain group index method of pavement design. What are the limitations of this method? [8]

(b) Write short notes on (any 4) :- [4×2=8]

(i) Hair pin bend.

(ii) Resisting length.

(iii) Cross – drainage in hill roads.

(iv) Maintenance problems in hill roads.

(v) Scupper.

(vi) Prevention of land slide.

(vii) Precipice work.

(b) Determine the lengths of different categories of roads in a state in India by the year 2018 using the 3^{ed} road development formula and with the following data.[10]

Area of state: 18000 sq.km.

Number of towns: 25

Road Density: 83 km/ 100 km^2.

UNIT-II

Q.2 (a) List and explain the properties and requirements of road aggregates. Also mention the various tests conducted for judging the suitability of road aggregates. [8]

(b) Explain briefly the construction of earth roads. Discuss the advantages and limitations of earth roads. [8]

OR

Q.2 (a) List different types of cutbacks. When are these used? Discuss in brief the tests carried out on cutback bitumen? [10]

(b) Briefly list the methods of construction of gravel roads. [6]

UNIT-III

Q.3 (a) What is Super elevation? Explain the steps for practical design of super elevation. [8]

(b) Calculate the length of transition curve for a plain and rolling terrain for the following data: Design speed = 80 kmph., Radius of curve = 250 m, Road width = 70 m, Maximum allowable rate of super elevation 1 in 150, Super elevation maximum restricted to 0.07. Assume pavement is rotated with respect to centerline. [8]

OR

Q.3 (a) Define SSD. Explain any one factor that restricts the SSD. [6]

(b) A valley curve is formed by a descending gradient of 1 in 25 meeting an ascending gradient of 1 in 30. Design the total length of valley curve, if the design speed is 100 kmph so as to fulfill comfort conditions and head light sight distance for night driving assuming suitable details. [10]

UNIT-IV

Q.4 (a) Indicate how the traffic volume data are presented and the results used in traffic engineering. [8]

(b) What are the various objects and applications of spot – speed studies? [8]

OR

Q.4 (a) Write short note on :- [4×2=8]

(i) Thirteenth highest hourly traffic volume.

(ii) PCU

(iii) Road Markings.

(iv) Traffic Signal System

(b) Explain origin and destination study. What are the various uses of O & D studies. [8]

UNIT-V

Q.5 (a) Explain "Flexible and Rigid" pavements and write the points of difference. [8]

(b) What are the special points to be considered in the alignment of hill road? Discuss. [8]

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B.Tech. VI Semester (Main/Back) Examination, April/May - 2017
Civil Engg.
6CE5A Transportation Engineering - I

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **five** questions, selecting **one** question from **each unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitable be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Unit - I

1. a) Explain transportation modes and their comparison. (6)

   b) Describe factors controlling highway alignment. Also explain the requirements of an ideal alignment. (10)

OR

1. a) What is the need for highway planning? Explain objectives of highway planning. (8)

   b) Explain the functional classification of roads. Write down objectives of Indian Road Congress (IRC). (8)

Unit - II

2. a) What are the desirable properties of road aggregates. Explain the test, which is used to measure abrasion resistance of stone aggregates as per Indian standards. (8)

   b) Give the various grades of bitumen, cut-back and emulsions and indicate the appropriate conditions and specifications for which they can be used. (8)

OR

2. a) How does a water-bound-macadam layer derive its strength? Explain the defects commonly noticed in water-bound-macadam and their likely causes? (8)

   b) Explain various types of rural road pavements, and their network planning. (8)

Unit - III

3. a) Calculate the super-elevation to be provided for a horizontal curve with a radius of 400m for a design speed of 100 K.P.H. In plain terrain. Comment on the results. What is the coefficient of lateral friction mobilized if super-elevation is restricted to 0.07. **(6)**

   b) A two lane pavement (7m) on a National Highway in hilly terrain (snow bound) has a curve of radius 60m. The design speed is 40 K.P.H. Determine the length of the transition curve. Determine the total length of the curve and tangent length if the deflection angle is 60°. Make suitable assumptions. **(10)**

OR

3. a) A six-lane divided carriageway has a curve 1000m long and a radius of 500m. The safe stopping sight distance is 200 m. Calculate the minimum set-back distance from the inner edge of the road to the edge of a building to ensure safe visibility. The pavement width per lane is 3.5 m. **(8)**

   b) Why widening is provided on curves? Calculate the extra widening necessary on a two lane pavement for a radius of curve of 100m. Assume the wheel base of design vehicle to be 6m. Assume a design speed of 65 K.P.H. **(8)**

Unit - IV

4. a) Give classification and significance of road signs and road markings. **(4)**

   b) The average normal flow of traffic on cross roads A and B during design period are 400 and 250 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 pedestrians is 12 sec. Design two phase signal by webster's method. **(6)**

   c) Discuss the various causes of road accidents. How highway design can enhance road safety? **(4)**

   d) Write down requirements for on-street parking and its effects on capacity and safety. **(2)**

OR

4. a) What are the design considerations for a rotary intersection? **(2)**

   b) What are the general principals to be observed in designing intersections? **(3)**

6E6035 (2)

c) How is the capacity of a roundabout is determined? (2)

d) Describe with sketches the various types of grade - separated junctions and the conditions under which they are provided. (9)

Unit - V

5. a) How are land - slides caused in Hill roads and how can they be prevented? (4)

b) What is an equivalent single-axle load? How can it be determined? (2)

c) How do the corner, edge and interior stresses vary due to i) temperature and ii) due to load? Where and when is the most critical situation found. (2)

d) Why is that during the day time, the stress is tensile at the bottom of a concrete pavement? (2)

e) How the vehicle damage factor (VDF) is calculated? (2)

f) Write a short note on recent developments in urban roads and their role in economic developments. (4)

OR

5. a) If the radius of relative stiffness is 55cm, and if the dowel are placed at every 30 cm, calculate the maximum load carried by a single dowel which is just blow the wheel. Assume that a wheel of 4100 kg is placed at the joint corner, and 50% of the load is transferred through the joints. (4)

b) Design a dowel bar system for a cement concrete slab for the following conditions : (12)

1) Design wheel load = 4100 kg

2) Design load transfer = 40 percent

3) Slab thickness, h = 20 cm

4) Joint width, z = 2 cm

5) Permissible flexural stress in dowel bar = 1400 kg/cm^2

6) Permissible shear stress in dowel bar = 1000 kg/cm^2

7) Permissible bearing stress in concrete = 100 kg/cm^2

8) K value of subgrade = 8 kg/cm^3

9) E = 3 ×10^5 kg/cm^2

10) μ = 0.15

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B. Tech. (Sem. VI) (Main / Back) Examination, April-May 2018
Civil Engg.
6CE5A Transportation Engineering - I

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL_____.   2. NIL_____

UNIT - I

1   (a) Enumerate different agencies related to highways in India. Also explain the objectives and activities of different agencies in India.

10

(b) What are the different modes of transportation ? Explain the specific functions of each of them.

6

OR

1   (a) The following datas were collected for planning the road development programme of a backward district

Total area   = 9600 km²

Agricultural and developed area = 3200 km²

Existing railway track = 115 km

Existing length of metalled road = 312 km

Existing length of un-metalled road = 450 km

Number of towns/villages in different population ranges are as below.

Population	>5000	2001-5000	1001-2000	501-1000	<500
Number of villages and towns	8	40	130	280	590

Calculate the additional length of metalled and unmetalled roads for the road system based on Nagpur road plan formulae for this district.

8

(b) Explain in detail the main features of various road patterns commonly used with neat sketches.

8

UNIT - II

2 (a) State the test principle and procedure of CBR test. Draw sketches showing standard details of CBR penetration test and expansion test.

10

(b) Explain the desirable properties of Bitumen.

6

OR

2 (a) What are the advantages and drawbacks of cement concrete roads ? Explain cement grouted and rolled concrete layers and their uses.

10

(b) What are the different types of joints which are used in construction of cement concrete pavement ?

6

UNIT - III

3 (a) Define superelevation. Derive an expression for finding the superelevation required if the design coefficient of lateral friction is 'f'.

6

(b) Calculate the length of transition curve and salient elements of combined curve consisting of a circular curve joined with a transition curve to its either end.

The required curve design inputs are as follows :

Road class = National Highways

Design speed = 50 kmph

Terrain and climate = Snow bound mountainous terrain

Road type = undivided two lanes 7.0 m wide

Radius of horizontal curve = 160.0 m

Angle of deflection between two tangents of the proposed combined curve = 64°

Chainage at the point of intersection = 500 m

Permissible rate of change of superelevation = 1 in 60.

The superelevation is attained by the rotation of pavement surface about its centre line. Take the maximum permissible superelevation as 7.0 per cent.

10

OR

3   (a) Distinguish between Intermediate sight distance and intersection sight distance using diagrams.

8

(b) Calculate the extra width of pavement required on a horizontal curve of radius 700 meter on a two lane highways, the design speed being 80 kmph. Assume wheel base = 6 meter.

8

UNIT - IV

4   (a) At a right angled intersection of two roads, Road 1 has four lanes with a total width of 12.0 meter and Road 2 has two lanes with a total width of 6.6 meter. The volume of traffic approaching the intersection during design hour are 900 and 743 PCU/hour on two approaches of Road 1 and 278 and 180 PCU/hour on two approaches of Road 2. Design the signal timings as per IRC guidelines.

10

(b) What are the applications of location file, spot, maps, collision diagram and condition diagram.

6

OR

4 (a) With neat sketches, show various types of traffic signs, classifying them in proper group.

8

(b) Write short notes on the following :
(i) Spot speed study
(ii) On-street parking
(iii) Trip generation
(iv) Origin and destination studies

8

UNIT - V

5 (a) Discuss the effects of repeated applications of loads on pavements. Explain equivalent wheel load factors for load repetitions.

8

(b) What is the importance of hill road drainage ? With the aid of neat sketches show the surface drainage system for effective drainage and disposal of water.

8

OR

5 (a) What are the various methods of rigid pavement design ? Explain Wastergard method of pavement design. What are the limitations of this method ?

8

(b) Soil subgrade sample collected from the site was analyzed and the results obtained are as given below :
Soil portion passing 0.074 mm sieve, percent = 50
Liquid limit, percent = 40
Plastic limit percent = 20
Design the pavement section by group index method for anticipated traffic volume of over 300 commercial vehicles per day.

8

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B.Tech. VI-Semester (Main & Back) Examination, April - 2019
Civil Engineering
6CE5A Transportation Engineering - I

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 26

Instructions to Candidates:

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Unit - I

1. a) What are the Characteristics of Road Transport in comparison with other systems? **(08)**

   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. **(08)**

(OR)

1. Calculate the total length of NH, SH, MDR, ODR and VR needed in a district as per second 20 - years road development plan or Bombay road plan. The Data collected from the district are given below:-

   i) Total Area = 18,400 km^2

   ii) Development and agricultural area = 8000 km^2

   iii) Undeveloped Area = 4800 km^2

iv) Population centres are as given below

Population Range	Number of Towns
< 500	200
500 - 1000	350
1000 - 2000	750
2000 - 5000	360
5000 - 10,000	150
10,000 - 20,000	80
20,000 - 50,000	25
50,000 - 1,00,000	10
> 1,00,000	5

(16)

Unit - II

2. a) State the test principal and procedure of CBR test. Draw sketches showing standard details of CBR penetration test and expansion test. **(10)**

    b) Explain the desirable properties of Aggregate to be used in different types of pavements construction. **(06)**

(OR)

2. a) What are the requirement of material, plants and equipment for cement concrete road construction? Discuss briefly. **(08)**

    b) Explain briefly the construction of earth roads. Discuss the advantages and limitations of earth roads. **(08)**

Unit - III

3. a) What are the objects of highway geometric design? List the various geometric elements to be considered in highway design. **(10)**

   b) What are the factors on which the stopping sight distance depends? Explain briefly. **(06)**

(OR)

3. a) Calculate the stopping sight distance for a design speed of 100 kmph. Take the total reaction time 2.5 second and the co-efficient of friction = 0.35 **(08)**

   b) Explain super elevation. What are the factors on which the design of super elevation depends? **(08)**

Unit - IV

4. a) Write short notes on :

   i) One street parking.

   ii) Origin and Destination studies.

   iii) Trip generation.

   iv) Spot speed study. **(08)**

   b) What are the various types of traffics accidents? Discuss the method of analyzing the speed of vehicle involved in the accident. **(08)**

(OR)

4. a) Explain the various types of traffic signals and their functions. How are the signal timing decide? **(08)**

   b) Explain the term traffic volume. What are the objects of carrying out traffic volume studies? **(08)**

5. a) Explain the CBR method of Flexible pavement design. How is this method useful to determine thickness of component layers? (08)

b) What is the importance of hill road drainage? With the aid of neat sketches show the surface, drainage system for effective drainage and disposal of water. (08)

(OR)

5. a) What are the various method of Rigid pavement design? Explain westergaard method and limitations of this method. (08)

b) A Subgrade soil sample has following properties :-

Soil passing soil 0.075 mm sieve = 60%

Liquid limit = 55%

Plastic limit = 45%

Design the pavement section by group Index method for heavy traffic with over 400 commercial vehicles per day. (08)

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6E6035

B. Tech. VI-Sem. (Main / Back) Exam., October 2020
Civil Engineering
6CE5A Transportation Engineering - I

Time: 2 Hours

Maximum Marks: 48
Min. Passing Marks: 16

Instructions to Candidates:

*Attempt **three questions**, selecting **one question each** from any three unit. All Questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

1. NIL _____   2. NIL _____

UNIT- I

Q.1 (a) Explain the role of transformation in the economic and social activities of the country. [8]

(b) What are the significant recommendations of Jayakar committee report? How this helped in road development in India? [8]

OR

Q.1 (a) Compare road transportation with other modes of transportation. [6]

(b) Enumerate different agencies related to highways in India. Also explain the objectives and activities of different agencies in India. [10]

UNIT- II

Q.2 (a) Explain the properties and requirements of road aggregates. Also mention the various tests conducted for judging the suitability of road aggregates. [10]

(b) Explain the desirable properties of Bitumen. [6]

OR

Q.2 (a) State the test principle and procedure of CBR test. Draw sketches showing standard details of CBR penetration test and expansion test. [10]

(b) Briefly list the methods of construction of gravel roads. [6]

UNIT- III

Q.3 (a) What is Super elevation? Derive an expression for finding the super elevation required if the design coefficient of lateral friction is "f". [8]

(b) Calculate the extra width of pavement required on a horizontal curve of radius 700 meter on a two lane highway, the design speed being 80 kmph. Assume wheel base = 6 meter. [8]

OR

Q.3 (a) Distinguish between Intermediate sight distance and Intersection sight distance using diagrams. [8]

(b) Calculate the length of transition curve for a plain and rolling terrain for the following data; Design speed = 80 kmph, Radius of curve = 250 m, Road width = 70m, Maximum allowable rate of super elevation 1 in 150, Super elevation maximum restricted to 0.07. Assume pavement is rotated with respect to centerline. [8]

UNIT- IV

Q.4 (a) What are various objectives and applications of spot-speed studies? [8]

(b) Indicate how the traffic volume data are presented and the results used in traffic engineering? [8]

OR [4×2=8]

Q.4 (a) Write short note on-

    (i) PCU

    (ii) Road Markings

    (iii) Traffic Signal System

    (iv) Thirteenth highest hourly traffic volume

  (b) Explain origin and destination study. What are the various uses of O and D studies? [8]

UNIT- V

Q.5 (a) What is the importance of hill road drainage? With the aid of neat sketches, show the surface drainage system for effective drainage and disposal of water. [8]

  (b) Explain ESWL and the concept in determination of the equivalent wheel loads. [8]

OR

Q.5 (a) Explain "Flexible and Rigid" pavements and write the points of difference. [8]

  (b) Calculate the stresses at interior edge and corner regions of a cement concrete pavement using Westergaard's stress equations. Use the following data :-

Wheel load = 5100 kg

Modulus of elasticity of cement concrete = 3×10^5 kg/cm^2

Pavement thickness = 18 cm

Poisson's ratio of concrete = 0.15

Modulus of subgrade reaction = 8.5 kg/cm^2

Radius of contact area = 15 cm

[8]

[2080]

[6E6035]

7E4035

B.Tech.VII Semester (Main/Back) Examination - 2013
Civil Engg.
7CE5 Transportation Engineering - II

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates:

*Attempt any **five** questions, selecting **one** question from each **unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)*

Unit - I

1. a) Summarized in a table relative advantages and disadvantages of Rail Transport and Road Transport **(8)**

   b) Summarize the strength & weakness of Indian Railway system. Also write in brief social obligation borne by Indian Railway **(8)**

OR

1. a) Define the term "Track Drainage" and need of proper track drainage **(6)**

   b) Draw a neat sketch of Turn table also name two number places where it is used **(6)**

   c) Explain creep of rails with causes & its effect on Rails **(4)**

Unit - II

2. a) Differentiate between under ground system and light Railsystem of Railways **(8)**

   b) What are the various features you will incorporate while modernizing a railway track **(8)**

7E4035 /2013 (1) [Contd....

OR

Unit - V

5. a) What are imaginary surface. Explain in detail (6)

   b) Explain ESWL method of designing of Rigid pavement (10)

   OR

5. a) What are the various factors affecting pavement design. What are the main factors responsible for failures in rigid pavement. (10)

   b) Describe the CBR method of designing of flexible pavement in brief (6)

_____

OR

2. a) Draw a typical layout of a level crossing. (6)

   b) Draw a figure of right hand turn out showing various constituents of a turnout. (6)

   c) Enlist various types of crossing used in India. (4)

Unit - III

3. a) Write down the parameters which affect the geometry of a track (6)

   b) Find the steepest gradient on a 3^0 curve for a B.G line with a ruling gradient 1 in 150 (6)

   c) Explain the Term cant deficiency & Negative cant (4)

   OR

3. a) Explain the need of widening of gauge on curves (4)

   b) Calculate the cant, transition length and maximum permissible speed to a 2^0 curve on a B.G section with a maximum sanction-A speed of 110km/h. Assume the equilibrium speed to be 70km/h and booked speed of the goods train to be 45km/h (12)

Unit - IV

4. a) Draw a typical layout of airport terminal with unit terminal concept. (6)

   b) Describe various surveys to be conducted for site selection of airport (10)

   OR

4. a) Draw type-II wind rose diagram and explain orientation procedure for runway (8)

   b) What do you understand by basic run way length? Explain factor influencing runway length. (8)

B.Tech. VII Semester (Main &Back) Examination , 2014
Civil Engineering
7CE5 Transportation Engineering - II

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates:

*Attempt any **five** questions, selecting **one** question from each **unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)*

Unit - I

1. a) Enlist the different materials used as ballast. Also explain the functions and requirements of good quality ballast to be used for railways.   **(8)**

    b) Explain with the help of neat Diagram the term "Coring of Wheels".   **(8)**

OR

1. a) Describe the functions and requirements of sleepers to be used for railways. Also enumerate the classification of sleepers according to material used. **(8)**

    b) Explain the different types of Rail failures with the help of neat diagrams. **(8)**

Unit - II

2. a) Enlist the different types of crossings. Explain with help of neat diagram the 'Spring Crossing'. Also name the different components in the diagram.   **(8)**

    b) Explain in detail the recent developments in Railway networking.   **(8)**

OR

2. a) Enlist the various component parts of switches. Draw the neat diagram of fixed heel type switch mentioning the names of different parts.   **(8)**

    b) Explain the elevated railway systems. Discuss the merits and demerits of elevated railway system over underground railway system.   **(8)**

Unit - III

3. a) Explain the different types of Gradients and write their permissible values adopted on Indian Railways. **(8)**

b) Determine the length of transition curve and draw the offsets at every 15m. Given that the design speed of the train on curve is 96 km. per hour on a Broad Gauge track. **(8)**

OR

3. a) Explain Grade compensation and its necessity at curves. What should be the compensated gradient provided, if the ruling gradient as 1 in 250 has been fixed on a B.G. section and a horizontal curve of 3^0 is also to be introduced over it. **(8)**

b) Explain the terms 'Super elevation' and 'Cant deficiency' in brief. Also write the limits of super elevation and cant deficiency for Indian Railways. **(8)**

Unit - IV

4. a) Enlist the various factors considered for the airport site selection. Explain any five important factors in brief out of the various factors listed. **(8)**

b) Explain the factors controlling taxiway layout and turn around taxiway. **(8)**

OR

4. a) What do you understand by the term 'Zoning' explain. Also explain the different zones and zoning laws. **(8)**

b) Explain the following terms -

   i) Wind Rose diagram

   ii) Apron **(2×4=8)**

Unit - V

5. a) Discuss the various design factors to be considered in determining the Airport pavement thickness **(8)**

b) Discuss the Westergaard's method for design of Air field Rigid pavement **(8)**

OR

5. Enlist the various Design methods of Airfield flexible pavements. Also explain each method for designing the pavement thickness of airfield flexible pavements. **(16)**

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7E 7064

7E7064

B.Tech. VII Semester (Main/Back) Examination, Dec. - 2015
Civil Engineering
7CE4A Transportation Engineering - II

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates:

*Attempt any **five** questions, selecting one question from **each unit**. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)*

Unit - I

1. a) Mention the requirements of an ideal permanent way. (6)

   b) Define Creep. What are the possible causes and effects of Creep? (3+7=10)

OR

1. a) What do you meant by 'Coning of wheels'? What are the advantages due to uniformity of gauges? (4×2=8)

   b) Draw a neat sketch of CST - 9 Sleeper. Mention the salient features. (8)

Unit - II

2. a) Distinguish between surface & under ground railway systems. Enumerate the factors that favour the selection of one over the other. (8)

   b) What is a turnout & how does it function? Explain with the help of suitable neat diagram. (8)

(1)

OR

2. a) Explain with neat sketches the following:

   i) Switch angle.

   ii) Theoretical nose of crossing.

   iii) Heel divergence.

   iv) Throw of switch. (2×4=8)

   b) What are the salient features of the kolkata metro railway? Enumerate the technologies used in its construction. (8)

Unit - III

3. a) Write short notes on: (2×4=8)

   i) Grade compensation on curves.

   ii) Negative cant.

OR

   b) In a layout of a B.G. Yard, 98^0 curve diverges from 5^0 main curve. If the maximum permissible speed on the main curve is 68 kmph, determine the restricted speed on diverging curve. (8)

OR

3. a) What are the objects of providing transition curves? Explain briefly the essential requirements of an Ideal transition curves. (8)

   b) Determine the equilibrium cant on a 2^0 degree curve on a broad gauge, if 16 trains, 10 trains, 8 trains, 4 trains and 2 trains are running at a speed of 50 kmph, 60 kmph, 70 kmph, 80 kmph and 100 kmph respectively. (8)

Unit - IV

4. a) Write a brief note on "Airport classifications. (6)

   b) What is Wind Rose diagram? Explain briefly with a neat sketch any one method of orientation of runway. (10)

OR

4. a) Explain the factors which influence the airport site selection. (6)

   b) Calculate the actual length of runway from the following data:

Airport Elevation	RL.:-100m
Airport reference temperature	28^0 C
Basic length of runway	900m
Highest point along the length	RL.:-97.00
Lowest point along the length	RL.:- 92.50

   (10)

Unit - V

5. Write detail note on the various methods for designing flexible airport pavements. (16)

OR

5. Describe the effect of jet aircraft characteristics on Airport pavement design. (16)

7E7064

7E7064

B. Tech. VII Sem. (Main/Back) Exam., Nov.-Dec.-2016
Civil Engineering
7CE4A Transportation Engineering - II

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks Main: 26
Min. Passing Marks Back: 24

Instructions to Candidates:

*Attempt any **five questions**, selecting **one question** from **each unit**. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT – I

Q.1 (a) Explain different types of rail failures with the help of neat diagrams.   [8]

    (b) Compare different material sleepers in tabular form.   [8]

OR

Q.1 (a) Explain the various factors considered in selection of alignment.   [10]

    (b) Enlist the various factors considered in gauge selection.   [6]

UNIT – II

Q.2 (a) Design a turnout with 1 in 16 crossing from the following data: [8]

(i) Gauge = 1.676m

(ii) Heel divergence = 13.3cm

(iii) Straight arm between T.N.C. and tangent point of crossing curve = 0.85m

(iv) Angle of crossing = 3°34′35″

(v) Angle of switch = 1°34′27″

(b) What do you understand by crossing. Explain different types of crossing with the help of neat sketches. [2+6=8]

OR

Q.2 (a) Enlist merits and demerits of various railway systems in urban areas. [8]

(b) Draw a neat sketch of a point and also explain it's various components. [3+5=8]

UNIT – III

Q.3 (a) What do you understand by widening of gauge at curve? If the wheel base of a vehicle moving on a B.G. track is 5.2m, the diameter of wheel is 1.5m and the depth of flanges below the top of rail is 3.5cm. Determine the extra width required to be provided on gauge, if the radius of curve is 160m. [3+5=8]

(b) Explain the term superelevation. What are the objectives of providing superelevation on curves of a railway track? [4+4=8]

OR

Q.3 (a) Calculate the maximum permissible speed on a curve of high speed B.G. track having following particulars:

(i) Degree of curve = 1°

(ii) Amount of Superelevation curve = 12cm

(iii) Length of transition curve = 150m

(iv) Maximum speed of the section likely to be sanctioned = 175 kmph. [10]

(b) Write short notes on: [2×3=6]

    (i)   Equilibrium cant.

    (ii)   Cant deficiency

UNIT – IV

Q.4 (a) An airport is proposed at an elevation of 600m above mean sea level where the mean of maximum and mean of average daily temperature of the hottest month are 43.2°C and 26.4°C respectively. The maximum elevation difference along the proposed profile of runway is 5.8m. If the basic runway length is 1380m, determine the actual length of runway to be provided. [10]

(b) What do you understand by zoning and also explain it's types and factors considered while framing zoning laws. [2+2+2=6]

OR

Q.4 (a) Describe various types of runway patterns with the help of neat sketches. [8]

(b) Write short notes on: [2×4=8]

    (i)   Hanger

    (ii)   Apron

UNIT – V

Q.5 (a) Describe Load classification number (LCN) method of rigid and flexible pavement design for runway. [12]

(b) Enlist causes of failure in rigid pavement. [4]

OR

Q.5 (a) Describe the Westergaard's method for design of rigid pavement for runway. [8]

(b) Enlist various types of flexible pavement failures. [8]

B. Tech. VII Sem. (Main/Back) Exam., Nov. – Dec. - 2017
Civil Engineering
7CE4A Transportation Engineering-II

Time: 3 Hours   **Maximum Marks: 80**
Min. Passing Marks: 26

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit**. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT-I

Q.1 (a) List out the various gauges prevailing in India with their gauge widths. What factors govern the selection of a suitable gauge? Discuss.   [8]

(b) Give brief description of 'CST – 9 sleeper' with neat sketch.   [8]

OR

Q.1 (a) Briefly explain the different types of rails, their advantages and disadvantages.   [8]

(b) What are the various theories that have been put forward to explain the development of creep? Describe wave motion theory.   [8]

UNIT-II

Q.2 (a) Draw a neat sketch of a right – hand turnout and list the principal components & terms connected with its layout. [8]

(b) Distinguish between elevated and underground railway systems. Also enumerate the factors that favour the selection of one over the other. [8]

OR

Q.2 (a) What are the salient features of the Jaipur metro railway? [6]

(b) Write short note on – [5×2=10]

(i) Number of crossing.

(ii) Spring or Movable Crossing.

(iii) Length of Tongue Rail & Stock rail.

(iv) Switch Angle.

(v) Flange way Clearance.

UNIT-III

Q.3 (a) A 8° curve track diverges from a main curve of 5° in the opposite direction. In the layout of a BG yard, calculate the super elevation and the speed on the branch line when the maximum speed permitted on the main line is 45 kmph. [10]

(b) What is negative cant? Under what circumstances its use is an obligation? [6]

OR

Q.3 (a) Explain the objective of providing transition curves on either side of a circular curve. [6]

(b) Calculate the length of the vertical curve between two gradients meeting in a summit, one rising at a rate of 1 in 100 and the other falling at a rate of 1 in 200. [10]

UNIT-IV

Q.4 (a) At an airport site at sea level with standard atmospheric conditions, the runway lengths required for take off and landing are 2000m & 2400m respectively. The proposed airport is situated at an altitude of 150m. If the airport reference temperature is 25°C and if the effective runway gradient is 0.35%, calculate the length of runway to be provided. [10]

(b) What are the factors which influence the airport site selection? [6]

OR

Q.4 (a) Define Wind Rose diagram. Also briefly explain any one method of orientation of runway with the help of necessary sketch. [10]

(b) Write short note on – [3×2=6]

(i) Corrections to basic Runway Length.

(ii) Airport classifications.

UNIT-V

Q.5 (a) Write detailed note on Westergaard's method for design of rigid pavement for runway. [8]

(b) What are the different factors which affect pavement design? [8]

OR

Q.5 (a) What are the different methods for designing flexible airport pavements? [8]

(b) Write detailed note on the effect of jet aircraft characteristics on Airport pavement design. [8]

7E7064

7E7064
B. Tech. VII Sem. (Main / Back) Exam., Nov. – Dec. - 2018
Civil Engineering
7CE4A Transportation Engineering - II

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks: 26

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. <u>NIL</u>   2. <u>NIL</u>

<u>UNIT- I</u>

Q.1 (a) Describe the requirements for an ideal permanent way. Also sketch the neat diagram of Permanent way. [8]

(b) State the classification of gradients and explain each in detail. [8]

<u>OR</u>

Q.1 (a) Write the design parameter of marshalling yard. Define the different types of marshalling yards. Give a sketch of a marshalling yard. [8]

(b) Discuss different types of rail section used on B. G. and M. G. in India. Mention the relative merits and demerits of any two of them. [8]

UNIT- II

Q.2 Explain in brief –   [8×2=16]

    (a)   Symmetrical Split

    (b)   Diamond Crossing

    (c)   Scissors Crossover

    (d)   Single Slip and Double Slip

    (e)   Gauntlet Track & Fixed Point System

    (f)   Gathering Lines

    (g)   Triangle

    (h)   Double Junction

OR

Q.2 (a)   What are the different types of stress induced in railway track?   [8]

    (b)   Discuss the objectives of Urban Transport. Explain the major issues relating to the development of the Metropolitan transport system.   [8]

UNIT- III

Q.3 (a)   What are the objects of providing transition curves? Explain briefly the essential requirements of an ideal transition curve.   [8]

    (b)   Explain Grade compensation and its necessity at curves. What should be the allowable ruling gradient, if the ruling gradient is 1 in 150 on a particular section of B. G. and at the same time a curve of 4 degree is situated on this ruling gradient.   [8]

OR

Q.3 (a) Explain the terms 'Super elevation' and 'Cant deficiency' in brief. Also write the limits of Super elevation and Cant deficiency for Indian Railway. [8]

(b) If a 8 degree curve of track diverges from a main curve of 5 degree in an opposite direction in the layout of B. G. yard, calculate the super elevation and the speed on the branch line, if the maximum speed permitted on the main line is 45 kmph. [8]

UNIT- IV

Q.4 (a) Write a brief note on "Airport Classifications". [8]

(b) What is Wind Rose diagram? Explain briefly with a neat sketch any one method of orientation of runway. [8]

OR

Q.4 (a) Enlist the various factors considered for the airport site selection. Explain any five important factors in brief out of the various factors listed. [8]

(b) Explain the factors controlling taxiway layout and turn around taxiway. [8]

UNIT- V

Q.5 (a) Write detail note on the various methods for designing flexible airport pavements. [8]

(b) What are the various factors to be considered in airport pavement design? Discuss the significance of each. [8]

Q.5 (a) What are imaginary surface? Explain in detail. [8]

(b) Explain ESWL method of designing of rigid pavement. [8]

7E7064

B.Tech. VII - Semester (Main&Back) Examination, Nov. - 2019
Civil Engineering
7CE4A Transportation Engineering - II

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **five** questions, selecting **one** question from **each unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.*

UNIT - I

1. a) Draw a neat sketch of a permanent way on an embankment. Name the various components. (8)

   b) What is coning of wheels? What are advantages of coning? (8)

(OR)

1. a) Mention the advantages of using a uniform Gauge for railway track in a country. What common Gauges are used in India? (8)

   b) Why creep in rails occurs? Mention the remedial measures to prevent creep. (8)

UNIT - II

2. a) Through a diagram show a typical layout of a left hand turnout of railway track. Name and show its various components. (8)

   b) What are the objectives of Urban mass Transportation? Which Railway systems of mass transportation are used in Indian cities? (8)

(OR)

2. a) What are the function of point and crossings in a Railway track? Mention requirements of a good crossing. (8)

   b) Explain the following :

   i) Popular railway Mass transportation system networks.

ii) Gaunlet track

iii) Check rails

iv) Double turnout. (8)

UNIT - III

3. a) Why super elevation is provided on railway curves? Explain negative super elevation. (8)

   b) Describe the purpose of different type of Gradients used in a Railway track. (8)

(OR)

3. a) Derive an expression, relating superelevation (e), width of Railway Guage(G), Speed (V) and the Radius of Curve (R). (8)

   b) What are the objectives of providing Transition curves of Railways? Explain how length of Transition curve is decided. (8)

UNIT - IV

4. a) Draw a Typical layout of an international Airport. Showing its component parts. Briefly mention function of each component. (8)

   b) Write short notes on the following :

   i) Cross wind component

   ii) Basic runway length

   iii) Imaginary surfaces

   iv) Runway Threshold. (8)

(OR)

4. a) Why corrections are required to Runway Lengths? What are the recommendations for applying the different corrections? (8)

   b) Write short notes on the following :

   i) Wind Rose diagram

   ii) Runway patterns.

   iii) Aprons in an airport

   iv) Terminal Building and its functions. (8)

UNIT - V

5. a) What are the significant differences between principles of Airport Pavement Design from design of highway pavements. (8)

   b) Explain the following : (8)

   i) Equivalent single wheel load (ESWL)

   ii) Westergaard's method of Rigid Pavement Design, for airport pavements.

(OR)

5. a) Describe the various factors that are considered in structural design of airport pavements. (8)

   b) Explain the following :

   i) Radius of relative stiffness.

   ii) CBR method of Flexible pavement Design for airport pavements. (8)

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