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Name.....

Reg. No.....

**FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE
EXAMINATION, DECEMBER 2009**

CE 04-505 -TRANSPORTATION ENGINEERING--I

(2004 admissions)

Time Three Hours

Maximum : 100 Marks

Answer the following.

1. (a) Explain importance of roads in India. Briefly outline the main features of various road patterns commonly in use.
(b) Derive an expression for finding extrawidening required on horizontal curve.
(c) Explain total reaction time of driver and the factors on which it depends ? Explain PIEV theory.
(d) Explain ruling, maximum and exceptional gradients. Specify the values recommended by IRC for plain and hills.
(e) Explain the term traffic volume. What are the objects of carrying out traffic volume studies ?
(f) What are the advantages and disadvantage of traffic signals ?
(g) What are the various types of failures in flexible pavement ? Explain the causes.
(h) What are the characteristics of an ideal airport layout ?
(8 × 5 = 40 marks)
2. (a) Explain the various factors controlling the alignment of roads. (9 marks)
(b) Derive an expression for calculating the overtaking sight distance on a highway. (6 marks)
Or
(c) A vertical summit curve is formed when an ascending gradient of 1 in 25 meets another ascending gradient of 1 in 100. Find the length of the curve to provide for a stopping sight distance of 120 meters. (7 marks)
(d) A national Highway passing through flat terrain has horizontal curve of radius equal to the ruling minimum radius. If the design speed is 100 kmph, calculate absolute minimum sight distance, superelevation, extra widening and length of transition curve. Assume necessary data. (8 marks)
3. (a) What are the different causes of traffic accidents ? Discuss briefly. (7 marks)
(b) The following data were obtained from the spot speed studies carried out at a city road during certain period of time. Suggest (i) speed limit for regulation ; (ii) speed to check geometric design elements ; (iii) lower speed group causing congestion ; (iv) median speed ; and (v) dispersion.

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Speed group (kmph)	No. of vehicles	Speed group (kmph)	No. of vehicles
0–10	200	50–60	100
10–20	500	60–70	30
20–30	600	70–80	15
30–40	400	80–90	10
40–50	200	90–100	5

(8 marks)

Or

- (c) Explain the procedure to design isolated traffic signal by Webster's method for a four-legged intersection with 12 movements.

(8 marks)

- (d) Explain on-street and off-street parking.

(7 marks)

- 1 (a) What are the various tests for judging the suitability of road stones? Discuss the objectives of carrying out each of these tests and their advantages and limitations.

(8 marks)

- (b) Design a flexible pavement for the following data :—

Subgrade CBR = 5 %.

The material available nearing construction site are as follows :

Gravely soil with CBR = 15 %

Soil kankar mix with CBR = 30 %

WBM with CBR = 98 %

Provide at least 50 mm. thick BC as surface course.

Present commercial vehicles = 300

Growth rate of traffic = 6.5 %.

Or

- (c) Explain the following terms :-

- Modulus of subgrade reaction
- Radius of relative stiffness,
- Radius of resisting section.

(3 × 2 = 6 marks)

- (d) Calculate the stresses at interior edge and corner region of a CC pavement by

- Westergaard.
- Bradburys stress coefficient

Modulus of elasticity of concrete = $3 \times 10^4 \text{ N/cm}^2$

Poisson's ratio of concrete = 0.15

Thickness of pavement = 300 mm

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Thermal expansion of concrete = 10×10^{-6} per $^{\circ}$ C.

Modulus of subgrade reaction = 0.15 N/mm^3

Spacing of contraction joint = 4.5 m.

Width of the slab = 3.5 m.

Wheel load = 50 kN

Radius of contact area = 150 mm.

Temperature differential for 300 mm. thick concrete = 16.8.

(9 marks)

5. (a) What do you understand by the term basic runway length ? Explain the procedure of determining the actual runway length required at a particular site.

(7 marks)

- (b) Write short notes on :

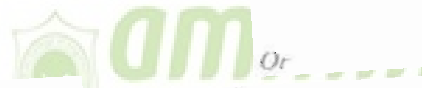
(i) Fillets.

(ii) Separation clearance.

(iii) Holding aprons.

(iv) Turn around or Bypass taxiway.

(8 marks)



- (c) The length of a runway at sea level standard atmospheric condition and zero gradient is 1600 m. The airport site has an elevation of 1000 m., and the reference temp. as 20° C. If the proposed runway grading permits an effective gradient of 0.20 per cent, determine the actual runway lengths required at the site.

(8 marks)

- (d) Explain step-by-step the procedure of designing the drainage network to handle the airport surface run-off.

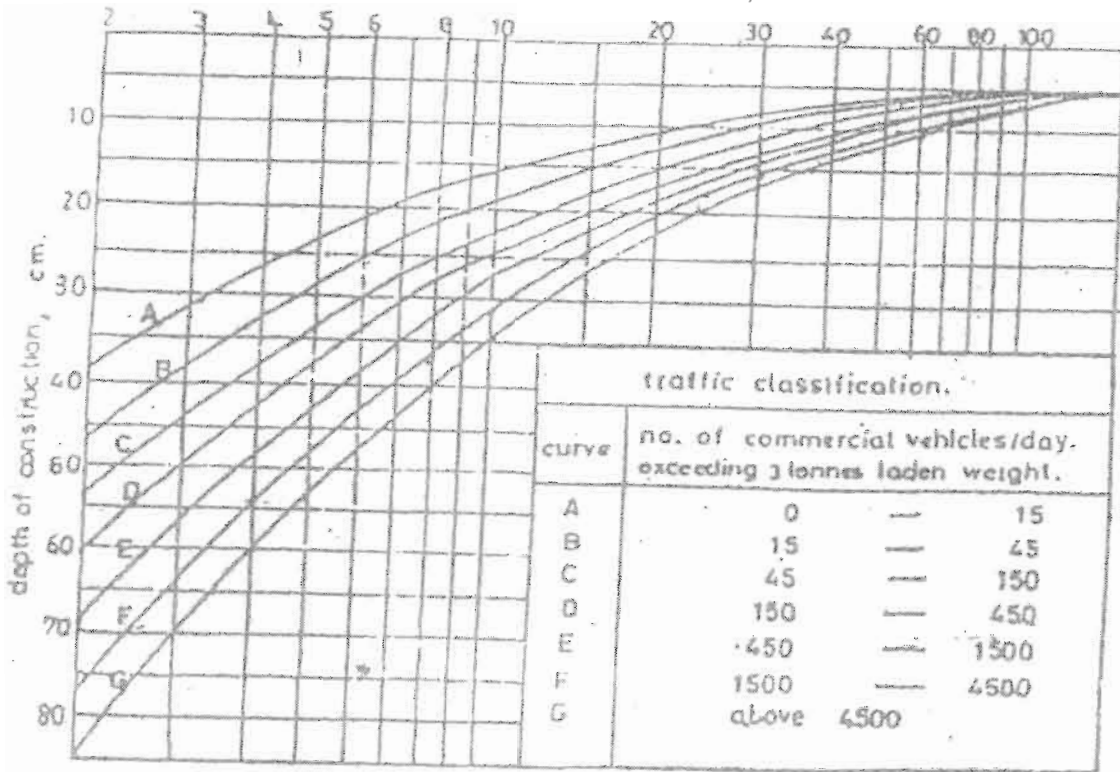
(Chart to follow on Page 4)

(7 marks)

[4 × 15 = 60 marks]

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C.B.R. DESIGN CHART (RECOMMENDED BY I.R.C.)

Q 4(b)

Warping stress coefficients

l/L or B/l	C	l/L or B/l	C
1	0.000	7	1.030
2	0.040	8	1.077
3	0.175	9	1.080
4	0.440	10	1.075
5	0.720	11	1.050
6	0.920	12	1.000

Q 4(d)