C.U.SHAH UNIVERSITY
Winter Examination-2015

Subject Name : Highway Engineering

Subject Code : 4TE04HYE1   **Branch :** B. Tech.(Civil)

Semester : 4   **Date :** 24/11/2015   **Time :** 2:30 To 5:30   **Marks :** 70

Instructions:
  (1) Use of Programmable calculator & any other electronic instrument is prohibited.
  (2) Instructions written on main answer book are strictly to be obeyed.
  (3) Draw neat diagrams and figures (if necessary) at right places.
  (4) Assume suitable data if needed.

Q-1   **Attempt the following questions:**   **(14)**

a)	What is Highway?	01
b)	What is Road?	01
c)	What is Surface dressing?	01
d)	Define Rigidity factor.	01
e)	What is Equivalent single wheel load?	01
f)	What is the formula used for design of a dowel bar?	01
g)	Most suitable material for highway embankments is	01
	(A) granular soil (B) organic soil (C) silts (D) clays	
h)	Stopping sight distance is always	01
	(A) less than overtaking sight distance (B) equal to overtaking sight distance	
	(C) more than overtaking sight distance (D) none of the above	
i)	The ruling design speed on a National Highway in plain terrain as per IRC recommendations is	01
	(A) 60 kmph (B) 80 kmph (C) 100 kmph (D) 120 kmph	
j)	The transition curve used in the horizontal alignment of highways as per IRC recommendations is	01
	(A) spiral (B) lemniscates (C) cubic parabola (D) any of the above	
k)	The camber of road should be approximately equal to	01
	(A) longitudinal gradient (B) two times the longitudinal gradient	
	(C) three times the longitudinal gradient (D) half the longitudinal gradient	
l)	The value of ruling gradient in plains as per IRC recommendation is	01
	(A) 1 in 12 (B) 1 m 15 (C) 1 in 20 (D) 1 in 30	
m)	The formation width of a double lane National Highway in embankment is	01
	(A) 11m (B) 0.10m (C) 7.5m (D) 12m or more	
n)	On the recommendation of Nagpur conference, the minimum width of a village road may be	01
	(A) 3m (B) 2.45m (C) 2.75m (D) 3.50m	

Attempt any four questions from Q-2 to Q-8

Q-2		**Attempt all questions**	**(14)**
	(a)	Write short note on "Indian road congress" (IRC).	05
	(b)	Write short note on road user characteristic.	05
	(c)	What are the advantages and disadvantages of rotary intersections?	04

Q-3		**Attempt all questions**	**(14)**
	(a)	What are the types of traffic surveys? Explain any two types of traffic survey.	05
	(b)	The plate load test conducted with a 75 cm diameter plate on soil sub-grade yielded a deflection of 2.5 mm under a stress of 800 N/cm^2. What is the modulus of elasticity of the sub-grade soil, in kN/cm^2?	05
	(c)	Explain the desirable properties which are expected from soil sub-grade.	04

Q-4		**Attempt all questions**	**(14)**
	(a)	Give detail classification of roads.	07
	(b)	What is intersection? Enlist various types of intersection. Write design criteria for intersection.	07

Q-5		**Attempt all questions**	**(14)**
	(a)	A pavement designer has arrived at a design traffic of 100 million standard axles for a newly developing national highway as per IRC: 37 guidelines using the following data: design life = 15 yr, commercial vehicle count before pavement construction = 4500 vehicles/day, annual traffic growth rate = 8%. Find the vehicle damage factor used in the calculation.	07
	(b)	Define the following terms pertaining to bitumen : (i) Asphaltic cement, (ii) Bitumen, (iii) Straight-run bitumen, (iv) Penetration grade bitumen, (v) Blown bitumen, (vi) Cut-back bitumen, (vii) Bituminous emulsion.	07

Q-6		**Attempt all questions**	**(14)**
	(a)	What are the various functions and desirable characteristics of pavements?	07
	(b)	Explain the Boussinesq's theory and how it can be used for design of highway pavements. What are its limitations?	07

Q-7		**Attempt all questions**	**(14)**
	(a)	Give a sketch showing the various layers in pavements, generally adopted in India. What are the functions of each of the above layers?	07
	(b)	Explain Westergaard's analysis of stresses for rigid pavements.	07

Q-8		**Attempt all questions**	**(14)**
	(a)	What are the objects of bituminous paving mix design?	05
	(b)	Explain the need for joints in cement concrete pavements.	05
	(c)	Distinguish between aggregate impact value, aggregate abrasion value, and aggregate crushing value.	04