Exam Seat No: _____   Enrolment No: _____

C. U. SHAH UNIVERSITY
WADHWAN CITY

University (summer) Examination - MAY 2015

Course Name: B. Tech. Semester-IV   Marks: 70
Subject Name: Highway Engineering   Date: 30/05/2014
Subject Code: 4TE04HYE1   Duration: - 3:00 Hours

Instructions:
(1) Attempt all questions of both sections in separate answer book/supplementary.
(2) Use of programmable calculator & any other electronic instrument is prohibited.
(3) Instructions written on main answer book are strictly to be obeyed.
(4) Draw neat diagrams & figures (If necessary) at right places.
(5) Assume suitable & perfect data if needed.

Section - I

Q-1	(a)	Define following terms: (i) Bitumen (ii) surface dressing.	2
	(b)	What is the formula used for design of a dowel bar	2
	(c)	What is the difference between Highway and Road?	2
	(d)	Which device is used for measuring the road roughness?	1
Q-2	(a)	Give detail classification of roads.	5
	(b)	What is intersection? Enlist various types of intersection. Write design criteria for Intersection.	5
	(c)	What are the types of traffic surveys? Explain any two types of traffic survey	4

OR

Q-2	(a)	Compare the rigid and flexible pavement systems from various criteria.	5
	(b)	What are the desirable properties of bitumen for use as a road construction material?	5
	(c)	What are the advantages and disadvantages of rotary intersections?	4
Q-3	(a)	Enlist the steps for bituminous mix proportioning.	5
	(b)	Explain Burmister's two-layer theory for design of pavements.	5
	(c)	What are the factors governing the performance of surface dressing?	4

OR

Q-3	(a)	Explain the types of pavements.	5
	(b)	What improvements have been made in the IRC Guidelines in 1984?	5
	(c)	What are emulsions and write its advantages?	4

Section – II

Q-4	(a)	Define term Asphaltic cement and Ductility of bitumen.	2
	(b)	What is polymer modified bitumen?	2
	(c)	The consistency and flow resistance of bitumen can be determined from which of the test? Why?	2
	(d)	What are cut-backs?	1
Q-5	(a)	Write a note on soil characteristics?	5
	(b)	What are the various types of joints in cement concrete pavements?	5

| | (c) | Draw a sketch of rotary intersection and define Diverging, Merging and Weaving length. | 4 |

<div align="center">OR</div>

Q-5	(a)	What are the advantages and disadvantages of the cement concrete roads?	5
	(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?	5
	(c)	Write short note on road user characteristic.	4
Q-6	(a)	Write short notes on Equivalent single wheel load (ESWL).	5
	(b)	The data given below pertain to the design of a flexible pavement	5

        Initial traffic = 1213 cv/d
        Traffic growth rate = 8% per annum
        Design life = 12 yr
        Vehicle damage factor = 2.5
        Distribution factor = 1.0

Find the design traffic in terms of million standard axle (MSA) to be catered.

| | (c) | Briefly describe the scope of highway engineering. | 4 |

<div align="center">OR</div>

Q6	(a)	Distinguish between aggregate impact value (AIV), aggregate abrasion value (AAV), aggregate crushing value (ACV).	5
	(b)	Design the reinforcement of a cement concrete slab 200 mm thick, assuming the following:	5

        1. Density of concrete: 2.3 gm/cc.
        2. Coefficient of Friction: 1.5.
        3. Transverse joint spacing = 15 m.
        4. Pavement width = 3.75 m.
        5. Working stress in steel: 1400 kg/cm^2 (140 MN/m^2).

| | (c) | Write short note on Traffic capacity. | 4 |

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