Subj	ect a	GUJARAT TECHN M. E SEMESTER – II • code: 1721302	OLOGICAL UNIVERSITY EXAMINATION – SUMMER • 2014 Date: 18-06-2014								
Subj	Subject Name: Pavement Design and Evaluation Time: 02:30 pm 05:00 pm										
1 11110 T4		.30 pm - 03:00 pm	Total Warks: 70								
Inst	ruct	ions:									
	1.	Attempt all questions.									
	2. 2	Make suitable assumptions who	erever necessary.								
	э. 1	Figures to the right indicate full	a marks.								
	4.	Use of IKC and relevant codes	permitted.								
0.1	(a)	Explain the various types of failures in flexible payement with neat sketch.									
C	(b)	Compare the Flexible and Rigid Pavement.									
Q.2	(a)	Explain the factors affecting pavement design.									
	(b)	b) Explain the Boussinesqos theory of flexible pavement									
		OR									
	(b)	Calculate the Vehicle Damage Factor from the following data 0									
		Axle load range (Tonnes)	% Frequency								
		18-16	08								
		10-14	18								
		14-12	32 26								
		10-08	15								
		08-06	06								
Q.3	(a)	Explain the Westergaardos theory of rigid pavement									
	(b)	It is proposed to widen a an existing 2 lane road to 4 lane divided road. Design $0'$									
		the pavement for new carriage way for the following data as per IRC.									
		5 6000 CV/ day									
		Design Life ó 20 Years									
		Design CBR of subgrade ó 5%									
		Traffic Growth Rate ó 8%									
		Vehicle Damage Factor ó 4.5									
			OR								
Q.3	(a)	Write a short note on õEquivale	nt Single Wheel Loadö	07							

(b) The CBR test carried out on a subgrade soil gave the following readings.

Penetration in	Load in Kg	Penetration in	Load in Kg
mm		mm	
0.0	0.0	3.0	58.0
0.5	4.0	4.0	70.0
1.0	14.0	5.0	77.5
1.5	30.0	7.5	93.2
2.0	41.0	10.0	102.5
2.5	50.0	12.5	110.8

The different pavement materials available near the site are as follows

- (i) Sandy soil with CBR value ó 8%
- (ii) Soil ó Kankar mix with CBR value ó 28%
- (iii) Yellow soil mixed with kankar, CBR value ó 90%
- (iv) Bitnuminous concrete for surfacing ó Minimum 10 cm thick

Design the pavement structure for commercial vehicles of 3000 per day with 8% growth rate by CBR method.

Q.4 (a) Calculate the stresses at interior, edge and corner regions of a cement concrete 07 pavement using Westergaardsøs stress equation from the following data Wheel Load = 6000 Kg Modulus of elasticity of cement concrete, $E = 3 \times 10^5 \text{ Kg} / \text{ cm}^2$ Pavement thickness, h = 20 cmPoissonøs ratio of concrete, $\mu = 0.15$ Modulus of subgrade reaction, $K = 6 \text{ Kg} / \text{ cm}^3$ Radius of contact area, a = 18 cm

(b) Explain the design considerations for spacing of Expansion Joint and 07 Contraction Joint.

OR

- Q.4 (a) Design a suitable concrete pavement (4.5 m x 3.5 m) as per IRC, for design 07 wheel load of 5100 kg and tyre pressure of 7 kg/cm². The CBR Value of subgrade soil is 5%. The traffic intensity at the end of design life is 2500 CV/day.
- Q.4 (b) Explain the design steps of Dowel bars.
- Q.5 (a) What are the factors causes waves & corrugations in flexible pavement ?
 (b) Explain various types of overlay.
 07
 - OR

Q.5 (a) Benkleman Beam deflection studies were carried out on various points of 07 flexible pavement during summer season with a test vehicle of 8170 kg rear axle load. Observations recorded at a pavement temperature of 42° C. Length of the stretch is 400 m.

Serial Number	Rebound	Serial Number	Rebound
of sub section	Deflection in	of sub section	Deflection in
	mm		mm
1	1.45	7	1.78
2	1.62	8	1.76
3	1.60	9	1.92
4	1.80	10	1.52
5	1.96	11	1.60
6	1.74	12	1.70

Compute the thickness of overlay of bituminous concrete, taking allowable deflection as 1.30 mm, if the factor for subgrade moisture correction is 2.0

(b) Discuss the importance of maintenance of highway.

07