B.E CONSTRUCTON ENGINEERING 4th YEAR 2nd SEMESTER EXAMINATION-2019

Answer any four questions .

Time : Three hours   Full Marks : 100

Assume relevant data if required.

Q-1. Check the safety of a cement concrete road against BUC , TDC , Temperature stress and stress due to wheel load for a two lane two way national highway in west Bengal, with following data. (25)

(i)   Traffic in both directions at the end of construction period= 1900 CVPD

(ii)   Grade of Concrete = M40

(iii)   E= 30000 Mpa

(iv)   Poisson's ratio= 0.15.

(v)   Thermal coefficient of concrete = $10 * 10^{-5}$ / C

(vi)   Tyre pressure = 0.8 Mpa

(vii)   Design life= 20 years

(viii)   Spacing of contraction joint = 4.5 m

(ix)   Width of the slab = 3.75 m

(x)   Rate of growth of traffic = 7.5% p.a

The results of the axle load data are given below

Single axle load		Tandem axle load	
Axle load class (t)	% of axle load	Axle load class (t)	% of axle load
19-21	0.7	34-38	0.3
17-19	1.8	30-34	0.3
15-17	4.6	26-30	0.5
13-15	10.8	22-26	1.8
11-13	21.1	18-22	1.5
9-11	23.0	14-18	0.8
Less than 9 t	30.0	Less than 14 t	2.8
Total	92 %	total	8.0 %

Q-2. (a) Explain the significance of expansion, contraction and construction joint in concrete pavement.

[10]

(b) Determine the spacing of expansion and contraction joint in a simply supported two lane concrete pavement of thickness 15 cm with a concrete laying temperature of 27^0 C and maximum summer slab temperature of 65^0 C. If the contraction joints are spaces at 10 m interval, determine the reinforcement required in the pavement. Allowable stress for steel is 3000 kg/cm^2. Assume factor of safety as 1.5 and allowable stress in tension in cement concrete is 0.80 kg/cm^2. [Assume relevant data if required]

[15]

Q-3.(a) Explain the concept of PSI and TSI with special reference to repair of bituminous road pavement.

[8]

(b) Determine the structural number of a bituminous pavement with top binder mix modulus as 3000 Mpa with a thickness of 150 mm followed by granular layer of 450 mm with elastic modulus of 250 Mpa resting on a clayey subgrade with 4% soaked CBR.   [7]

© Explain better reliability of pavement design by AASTHO design approach for flexible road pavement.   [10]

Q-4. (a) Define roughness index of a road pavement. How it is measured? Discuss the significance of roughness index in quality monitoring of road pavement .   [12]

(b) Define texture depth. Illustrate the significance of skid resistance with reference to condition monitoring of road pavement.   [18]

© Explain why dowel bars are not provided in thin concrete pavement section?   [5]

Q-5(a) A four legged right angled intersection is to be signalised with a fixed time 2 phase signal with design hour flow and saturation flow data as given below

	North	South	East	West
Design hour flow	950	550	850	750
Saturation flow	2400	1900	3100	2900

Determine the optimum cycle time and apportion the green times in the two phases.   [15]

© Discuss in brief the limitations of Kolkata city road intersection management by signalised operation.

[10]