

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- Oct 2017

B.Tech Vth Semester

COURSE CODE: 10B11CE511

MAX. MARKS:25

COURSE NAME: Highway Engineering

COURSE CREDITS: 04

MAX. TIME: One Hour Thirty Minutes

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Assume any other missing data accordingly.

Q1. The load-penetration values of CBR tests conducted on two soil specimens (S) of a particular soil are given below. Determine the average CBR value of the soil if 10 divisions of the load dial represents 20 kg load in the calibration chart of the proving ring. (3)

Penetration, mm	0.0	0.5	1.0	1.5	2.0	2.5	3.0	4.0	5.0	7.5	10.0	12.5
Load divi., S-1	0	10	18	23	34	40	50	62	70	87	95	109
Load divi., S-2	0	0.5	3.5	9.0	18	30	40	54	64	80	88	102

Q2. A valley curve of a State Highway is formed by a descending gradient of 1 in 20 meeting an ascending gradient of 1 in 30. Design the length of a valley curve to fulfill both comfort condition and head light sight distance requirement for a design speed of 80 kmph. Assume rate of change of centrifugal acceleration = 0.60 m/sec³. (3)

Q3. A mix contains coarse aggregate (SG= 2.7), fine aggregate (SG=2.9), and mineral filler (SG=1.5) in proportion 60:35:5 by weight. These materials when mixed with bitumen (SG=1.01) and compacted to a unit weight of 2300 kg/m³ contains 5% voids. How much bitumen does the specimen contain? How will you arrive at the optimum bitumen content based on the curves plotted in Marshall's test? (4)

Q4. Define Modulus of subgrade reaction. A plate load test was conducted on a soaked subgrade during monsoon season using a plate diameter of 30 cm. Determine the modulus of subgrade reaction for the standard plate. The following data is obtained after test- (3)

Mean settlement, mm	0.0	0.26	0.52	0.76	1.02	1.26	1.53	1.76
Load values, kg	0.0	540	1010	1290	1510	1600	1720	1840

Q5. Explain – (i) Softening point test on bitumen (ii) Soundness test on aggregates (3)

Q6. Explain ESWL. Calculate ESWL of a dual wheel assembly carrying 2044 kg each for trial pavement thickness values of 150 and 250 mm. Centre to centre spacing between the two tyres = 270 mm and clear gap between the wall of the tyres = 110 mm (Use log-log graph). (3)

Q7. What is effective CBR as per IRC:37-2012 ? Calculate design traffic in msa for following data- Four lane single carriageway, Initial traffic at last count = 3000 cvpd (both directions), VDF= 3.6, Design life = 20 years, No. of years between last count and completion of construction = 3 years. (3)

Q8. Mention the specifications of materials and construction steps for water bound macadam base course. (3)