

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- Oct 2019

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. (i) Draw a schematic pavement section with bituminous layers, granular layers showing the locations of critical strains in flexible pavement. (2)

(ii) Write all the input parameters to be used in IITPAVE software. (1)

Q2. (i) What is the effective CBR, if the CBR value of top 500 mm subgrade and of embankment below subgrade is 20% and 8% respectively? The surface deflection determined using IITPAVE software is 1.40 mm. (1)

(ii) Determine the design traffic for the following data- four lane divided carriageway, initial traffic in the year of completion of construction = 5000 cvpd (two way), traffic growth 6%, design life period 20 yrs, vehicle damage factor = 5.2. (2)

Q3. (i) Determine the allowable vertical compressive strain on the top of subgrade and allowable horizontal tensile strain at the bottom of bituminous course for design traffic of 53 msa using 90% reliability rut life model and fatigue life model respectively, if VG30 is used in the construction of bituminous mix with air void content and effective bitumen content of 4.5% and 10.5% respectively. (3)

(ii) Explain the terms "Vehicle Damage Factor" and "Lane Distribution Factor". (2)

Q4. (i) Explain "Densely Graded Bituminous Mixes" in detail. (3)

(ii) Write the construction steps and material used in "Bituminous Macadam". (2)

Q5. (i) 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- (2)

Mean settlement, mm	0.0	0.35	0.59	0.83	1.11	1.39	1.68	1.91
Load values, kg	0.0	615	1085	1365	1585	1675	1795	1915

(ii) Explain- (i) Softening point test of bitumen, (ii) Soundness test of aggregates (2)

Q6. (i) Explain ruling, maximum and exceptional gradients. Specify the values recommended by IRC. (2)

(ii) 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/sec^3 . (3)