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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -3 EXAMINATION- Dec 2017
B.Tech Vth Semester

COURSE CODE: 10B11CE511 MAX. MARKS:35
COURSE NAME: Highway Engineering
COURSE CREDITS: 04 MAX. TIME: Two Hours

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. Answer the following-

(i) Arrange the following types of roads in ascending order of steepness of camber in same rainfall region- 1) WBM roads 2) CC Roads 3) BC Roads 4) Gravel Roads **(1)**

(ii) What will be the maximum flow in vph, if it was noted that on a road section the free speed was 80 kmph and the jam density was 70 vpkm? **(1)**

(iii) The load, warping and frictional stresses in a cement concrete slab are 210, 290 and 10 N/mm^2 resp., then what will be the critical combination of stress during summer mid day? **(1)**

(iv) If super elevation is not provided on a horizontal curve, then the portion of the road where potholes likely to developed- 1) inner edge 2) outer edge 3) centre of road 4) shoulder? **(1)**

(v) In rigid pavement, if radius of contact area = 15 cm and radius of relative stiffness =70.6 cm, then determine the location where the crack is likely to develop due to corner loading. **(2)**

Q2. The design thickness of a CC pavement is 26 cm considering a design axle load (98th percentile load) of 12000 kg on single axle and M-40 concrete with characteristic compressive strength of 400 kg/cm^2. The radius of relative stiffness is 62.2 cm. If the elastic modulus of dowel bar steel is 2X10^6 kg/cm^2, modulus of dowel-concrete interaction is 41,500 kg/cm^3 and joint width is 1.8 cm, design the dowel bar considering edge loading. **(4)**

Q3. At a right angled intersection of two roads, Road A has four lanes with a total width of 15.0 m and Road B has two lanes with a total width of 7.5 m. The volume of traffic approaching the intersection during design hour are 1100 and 800 PCU/hour on approach Road A; the traffic is 320 and 220 PCU/hour on approach Road B. Design the signal timings as per IRC guidelines, assuming the necessary data. **(5)**

Q4. BBD test was carried out on a stretch of four lane single carriageway flexible pavement of State Highway. Determine the characteristic deflection and design traffic from the following data- temperature during the test was 29.8°C, correction for subgrade moisture content is 1.3, initial commercial traffic at the end of construction is 1350 CVPD (in both direction), annual growth rate of vehicles is 7.5%, design life is 15 yrs, VDF is 3.2 **(5)**

D_o	107	107	107	107	107	107	107	107	107	107	107	107
D_i	57	56	58	60	59	57	53	61	56	54	55	59
D_f	55	52	56	59	54	55	50	57	54	52	52	56

Q5. A state highway through a rolling terrain has a horizontal curve of radius equal to ruling minimum radius. Design the following, assuming the necessary data- Ruling minimum radius, superelevation, extra widening, length of transition curve. **(4)**

Q6. What is traffic rotary? Explain the various factors that are to be considered in the design of rotary intersection. **(4)**

Q8. Draw neat sketch of the following- (i) Partial clover leaf interchange (ii) STOP sign (iii) Diamond interchange (iv) NO Stopping sign (v) Hair Pin Bend left (vi) Speed limit sign **(3)**

Q9. Write short note on-

(i) 30^{th} highest hourly traffic volume

(ii) Warrants for installation of traffic control signal **(4)**