

Course No: ECGD4228

Course Title: Transportation Eng. II

Date: 12.08.2012

No. of Questions: 6

Time: 120 Minutes

Open-Book: (Yes)

University of Palestine



Final Exam

Summer 2011/2012

Total Grade: 60

Instructor: Dr. Wa'el M. Albawwab

Student No.:

Student Name:

College Name:

Dept. / Specialist:

Using Dictionary: (Yes)

Using Calculator: (Yes)

Q1- Give a brief summary for two different topics of the term presentations. **(5 Marks)**

Q2- What PSD is necessary for a safe passing maneuver to be carried out by a vehicle moving at 50 mph on a two-lane highway? Assume that the passing vehicle accelerates to passing speed before moving into the left lane. Take into consideration: Passing vehicle driver's PRT = 2.5 sec, Passing vehicle's acceleration rate = 2.15 ft/sec^2 , Passing speed of passing vehicle = 60 mph, Speed of slow vehicle = 50 mph, Speed of opposing vehicle = 60 mph, Length of slow vehicle = 22 ft, Length of passing vehicle = 22 ft, Clearance distance between passing and slow vehicles at lane change = 20 ft, Clearance distance between passing and slow vehicles at lane re-entry = 20 ft, Clearance distance between passing and opposing vehicles at lane re-entry = 250 ft. **(10 Marks)**

Q3- A concrete rigid pavement is constructed on 8 in. thick subbase with an elastic modulus of 15 ksi, the roadbed soil resilient modulus 5 ksi, and the bedrock depth is about 10 ft. If the projected slab thickness is 8 in. and the potential loss of subbase support is 0.5, determine:

(a) the effective modulus of subgrade reaction **(5 Marks)**

(b) the corresponding average effective relative damage **(5 Marks)**

Course No: ECGD4228

Course Title: Transportation Eng. II

Date: 12.08.2012

No. of Questions: 6

Time: 120 Minutes

Open-Book: (Yes)

University of Palestine



Final Exam

Summer 2011/2012

Total Grade: 60

Instructor: Dr. Wa'el M. Albawwab

Student No.:

Student Name:

College Name:

Dept. / Specialist:

Using Dictionary: (Yes)

Using Calculator: (Yes)

Q4- If a stopping sight distance of 400 ft is to be maintained on an equal tangent sag vertical curve with tangent grades of descending 3.4% and 0%, determine the required length of the curve. Assume a vertical clearance at the undercrossing of 17 ft, a headlight height of 2 ft, and a beam upward divergence angle of 1° . **(10 Marks)**

Q5- A horizontal curve for a four-lane highway section in an urban area has a design speed of 85 km/hr and an assigned middle ordinate of 5.8 m. What is the recommended radius of this curve in order to avoid sight distance problems? Assume that the highway surface is wet concrete ($f = 0.27$) and descending at 5%, and the driver has a brake reaction time of 1.1 seconds. **(10 Marks)**

Q6- Use the 1993 AASHTO design method to determine the layer depths of a dense graded HMA major urban highway with a crushed stone base and a granular subbase. The highway has 3 lanes in each direction and the cumulative ESAL for a 18 years design period is 9×10^7 . The area has an excellent drainage quality with less than 5% of the time the moisture level is approaching saturation. The average annual relative damage for the roadbed soil is 0.19. The subbase has a CBR value of 80% and the resilient modulus of the untreated base material is 40 ksi. Take into consideration a reliability level of 95% and an overall standard deviation of 0.46. **(15 Marks)**