Course No: CVL 4324
Course Title: Transport. Eng. II
Date: 25/05/2013
No. of Questions: 7
Time: 180 Minutes
Using Calculator (Yes)

University of Palestine

Open-Book Final Exam
2nd Semester 2012/2013
Total Grade: 60

Instructor: Dr. Wa'el M. Albawwab
Student No.: _____
Student Name: _____
College Name: _____
Dep. / Specialist: _____
Using Dictionary (Yes)

Q1-

a) Explain all the expected pavement distresses. **(5 Marks)**

b) Explain the methods for determining the roadway condition. **(5 Marks)**

Q2-

a) Describe the structural components of a flexible pavement. **(5 Marks)**

b) Discuss the purpose and describe the methods of soil stabilization. **(5 Marks)**

Q3-

a) Determine the minimum radius of a horizontal curve required on a bicycle pathway if the average speed of bicycles is 20 mph and the minimum superelevation is 2% in order to facilitate drainage. **(5 Marks)**

b) If the total change in vertical grade is 10%, determine the minimum length of the vertical curve required for this bicycle pathway. **(5 Marks)**

Q4- Design the pavement for an expressway consisting of an asphalt concrete surface, a crushed-stone base, and a granular subbase using the 1993 AASHTO method. The cumulative ESAL in the design lane for a design period of 18 years is 7×10^6. The area has an excellent drainage quality with 5% of the time the moisture level is approaching saturation. The effective roadbed soil resilient modulus is 7 ksi, the subbase has a CBR value of 80%, the resilient modulus of the base is 40 ksi, and the resilient modulus of asphalt concrete is 450 ksi. Assume a reliability level of not less than 90% and a standard deviation level of 0.4. **(10 Marks)**

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Q5- A concrete rigid pavement is to be constructed on a 8 in. thick subbase with an elastic modulus of 15 ksi, a roadbed soil resilient modulus of 5 ksi, and a bedrock depth of 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)**

Q6- Determine the slab thickness for an expressway with the traffic load listed below. The pavement is to be constructed with doweled joints but without shoulders. The concrete modulus of rupture as 700 psi and the modulus of subgrade reaction as 150 pci. **(10 Marks)**

Axle Load (kips)	52T	50T	48T	46T	44T	42T	40T	30S	28S	26S	24S	22S
Design Repetition ($\times 10^3$)	4.1	30	39	48	158	172	241	3.3	3.2	9.7	543	642

Q7- (BONUS) A wide clay deposit is to be used as a roadbed for a major highway:

a) Is flexible or rigid paving suitable for such a site condition? Explain. **(5 Marks)**

b) What steps should be done to avoid potential distresses? Explain. **(5 Marks)**

End of Questions

Good Luck