M.TECH. DEGREE EXAMINATION
Model Question Paper - I
Branch: Civil Engineering
Specialization: Transportation Engineering
First Semester
MCETE103   PAVEMENT ANALYSIS AND DESIGN
(Regular – 2013Admissions)

Time: 3 Hours   Max. Marks: 100

1 a) Explain flexible and rigid pavements and bring out the points of differences.   10 marks

   b) List the factors affecting design performance of pavements   10 marks

   c) Using deflection criteria, calculate the ESWL of a dual wheel assembly carrying

     2044kg each for pavement thickness of 20cm.Centre to centre spacing of tyre is

     27cm and tyre pressure is 6 kg/cm$^{2.}$ 5 marks

OR

2 a)   What are the various functions and desirable characteristics of pavements?   10 marks

   b)   Explain how the elastic modulus of subgrade and base course are estimated using plate

      bearing test data   10 marks

   c)   Differentiate between ESWL and EWLF   5 marks

3 a) Discuss the vertical stress distribution under the pavement   7 marks

   b) List different methods of design of flexible pavement and state the principles   8 marks

   c) A two lane two way carriageway carries a traffic load of 1500 cvd .The rate of growth of

     traffic is 5% per annum.The design life is 5 years.The vehile damage factor is 2.5.CBR value of

     soil is 7% .Calculate a) Cumulative number of standard axles to be used in the design b) Total

     pavement thickness,c) composition of the pavement   10 marks

OR

4 a) Explain the CBR and IRC methods of design of flexible pavements.Discuss the advantages

     and limitations.   10 marks

   b) Explain Burmister's two layer and three layer theory   5 marks

   c)   Discuss the concept of equal vertical deflection criteria and applying deflection criteria

     calculate the ESWL of a dual wheel assembly carrying 20.44 kN each for pavement

     thickness of 15 cm. Centre to centre spacing of tyre is 27cm and tyre pressure is 60N/cm^2

                                       10 marks

5 a) Discuss the design principles of rigid pavement.   5 marks

   b) Calculate the stresses at interior, edge and corner regions,of a concrete

      pavement using Westergaards stress equation for the following data:

      Wheel load=4100 kg,tyre

      Modulus of elasticity of concrete=$3.3*10^5$ kg/cm^2

      Pavement thickness=18cm, Modulus of subgrade reaction=2.5kg/cm^3

      Diameter of loaded area =25cm, Poisson's ratio of concrete= 0.15   10 marks

   c) Explain the need for joints in cement concrete pavements and mention the IRC guidelines for

      joint spacing   10 marks

OR

6 a) Explain the development and action of temperature stress in rigid pavements.How to reduce

       temperature stress in pavements.   10 marks

   b) Design and detail dowel bars at expansion joints of a concrete pavement of thickness 20 cm ,

       and design wheel load of 41 kN. Assume load capacity of dowel system as 40% of design

       wheel load.Joint width 25mm, permissible stress in dowel bars, shear stress 10kN/cm^2 and

       flexural stress 14kN/cm^2. Bearing stress in concrete permissible is 1kN/cm^2,K- value on sub

       base is 80 N/cm^3 10 marks

   c) Sketch the details of the following 1) Dummy contraction joint.2) A tongue and grooved

      warping joint   5 marks

  7 a) Explain the necessity of design approach and method of strengthening of existing

      Pavements for the following cases.

      i)Flexible overlay over flexible pavement   5 marks

      ii)Rigid overlay over rigid pavement   5 marks

      iii)Rigid overlay over flexible pavement   5 marks

      iv)Flexible overlay over rigid pavement   5 marks

   b) Write a note on Pavement Maintanence Management System   5 marks

OR

8 a) What are the methods of pavement evaluation?   10 marks

  b) Describe the Benkelman Beam and its uses?   10 marks

  c) Explain white topping   5 marks