**R09**

**Code No: C8704**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**

**M.Tech I Semester Examinations, April 2011**

**PAVEMENT ANALYSIS AND DESIGN**

**(HIGH WAY ENGINEERING)**

**Time: 3hours** **Max. Marks: 60**

**Answer any five questions**

**All questions carry equal marks**

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1. What are the types of pavements? Discuss in detail various factors affecting design of pavement. [12]

2(a). Discuss the Boussinesq's theory for stresses in single layer of pavement.

(b). Write the various assumptions in linear elastic multilayered pavement system and discuss their practical applicability in reality. [12]

3. Discuss the in detail with neat sketches, the theories which describe about stresses in two layered and there layered pavement systems. [12]

4. Discuss the difference between modulus of elasticity and resilient modulus of pavement material. Write the different formulas used for determination of determination of resilient modulus of sub grade soil. [12]

5(a) What are the factors affecting bituminous mix design? Explain in detail.

(b) The following test results were obtained from a fatigue testing of a bituminous beam. Calculate the stiffness modulus of the bituminous mix.
Bituminous dimensions: Breadth = 75 mm, Depth = 75 mm, Span length = 380 mm. Loading Details: s of loading and 0.4 s of rest period
0.1 Magnitudes of loads at 1/3 distance from both ends of the beam = 1.5 kN
0.2 . Deflection at the centre of the beam = 0.02 mm. [12]

6(a) Discuss the serviceability concept and traffic loads in the AASHTO design of flexible pavement.

(b) Design a flexible pavement as per the AASHTO, 1993 guidelines from the following data: Reliability, R = 90%, Standard deviation, S0 = 0.4, Estimated number of 18 kip ESAL relationships over a design life of 20 years = 10 million, The loss of serviceability = 2, Resilient modulus of asphalt = 400000 psi (400 ksi), base course = 20000 psi (20 ksi), subbase course = 10000 psi (10ksi) and subgrade (mean value) = 3.3% of CBR (= 1500 x 3.3 = 5000 psi = 5 ksi).
To drain off the water from base and subbase courses the required duration are one day and a week respectively. Time of pavement structure is exposed to moisture levels approaching saturation = 15%. [12]

7. Write the various design guidelines along with a flow chart for CC pavements of rural roads as per the IRC: SP62-2004. [12]

8. Why do you need concrete overlays on existing bituminous pavement? Discuss the design guidelines (as per IRC: SP: 76-2008) of CC overlay thickness. [12]

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