APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY
08 PALAKKAD CLUSTER

Q. P. Code: TE0820103-I   (Pages: 3)

FIRST SEMESTER M.TECH. DEGREE EXAMINATION MARCH 2021

Branch: Civil Engineering   **Specialization: Transportation Engineering**

08CE6203 Pavement Analysis and Design
(Common to TE)

Time: 2 hour 15 minutes   Max. Marks: 60

Answer all six questions.

Modules 1 to 6: Part 'a' of each question is compulsory and answer either part 'b' or part 'c' of each question.

(IRC-Code, Charts and tables can be used wherever necessary.)

Q. No.	Module 1	Marks
1.a	What is the minimum grade of pavement quality concrete? List out the requirements of pavement quality concrete	3
	Answer b or c	
b	Explain in detail any Los angles abrasion test with neat sketches	6
c	Explain in detail on Impact test with neat sketches	6

| Q. No.	Module 2	Marks
2.a	Explain briefly about the lane distribution factor and vehicle damage factor	3
	Answer b or c	
b	Explain in detail about the airport pavement	6
c	Explain the components and functions of Rigid pavements with neat sketches	6

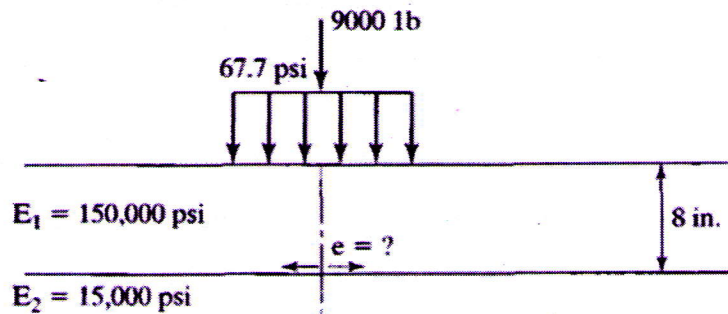| Q. No.	Module 3	Marks
3.a	Explain in detail on stresses and deflection in one layer system	3
	Answer b or c	

b Figure shows a set of dual tires, each having contact radius 4.52 in. (115 mm) and contact pressure 70 psi (483 kPa) . The center-to-center spacing of the dual is 13 .5 in . (343 mm). Layer 1 has thickness 6 in . (152 mm) and elastic modulus 100,000 psi (690 MPa) ; layer 2 has elastic modulus 10,000 psi (69 MPa) . Determine the vertical deflection at point A, which is on the interface beneath the center of one loaded area.   **6**
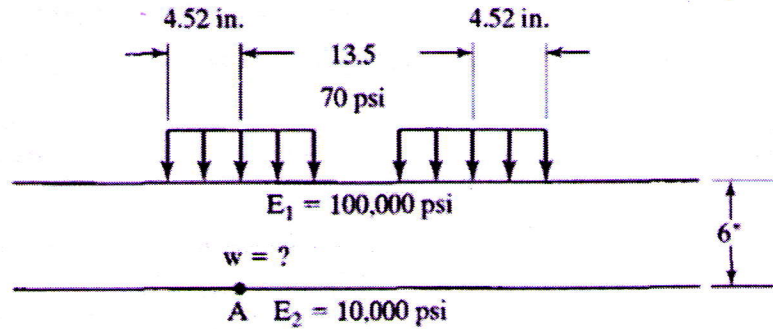
c The Figure shows a full-depth asphalt pavement 8 in. (203 mm) thick subjected to a single-wheel load of 9000 lb (40 kN) having contact pressure 67 .7 psi (467 kPa). If the elastic modulus of th e asphalt layer is 150,000 psi (1 .04 GPa) and that of the sub grade is 15,000 psi (104 MPa), Determine the critical tensile strain in the asphalt layer.   **6**

Q. No.	Module 4	Marks

4.a Differentiate top-down and bottom-up cracking of rigid pavement with neat sketch   **3**

Answer b or c

b Explain in detail on failure criteria of fatigue failure with any one of model   **6**

c Explain in detail on failure criteria of Rutting failure with any one of model   **6**

Q. No.	Module 5	Marks
5.a	Explain Briefly about the PCA Method of rigid pavement design	4

Answer b or c

b	Explain in detail on stresses due to curling with neat sketches	8
c	Explain in detail on combined stresses in rigid pavement.	8

Q. No.	Module 6	Marks
6.a	What is the necessity of providing dowel bar and tie bar in rigid pavement construction?	4

Answer b or c

b   Design the expansion and contraction joint for a rigid pavement with the following data   8

Width of joint-2.5cm

Minimum Temperature – 17 degree centigrade

Maximum Temperature – 45 degree centigrade

Co-efficient of Thermal expansion – 10×10^{-6} per degree centigrade

Allowable stress in tension concrete – $0.8 kg/cm^2$

Unit weight of concrete – $2400 kg/m^3$

 Assume necessary data required

c   Design the tie bar for the given data   8

Breadth of slab - 4m

Co-efficient of Friction – 1.5

Unit weight of slab – $600 Kg/m^2$

Allowable tensile stress in steel – $2000 kg/cm^2$