

B.E. (Civil Engineering) Model Curriculum Semester-VI
PEC-CE601 - Pavement Design

P. Pages : 2

Time : Three Hours



GUG/W/24/13730

Max. Marks : 80

- Notes :
1. All questions carry equal marks.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.
 4. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) Compare Highways with Airways Pavement. 8
- b) What is ESWL? Calculate ESWL of a dual wheel assembly carrying 2050 kg wheel load each for pavement thickness of 20, 25 and 30 cm. Centre to centre tyre spacing is 25 cm and the distance between the walls of the tyre is 12 cm. 8

OR

2. a) State and explain in brief various factors affecting design of pavements. 7
- b) From a traffic volume data for highway, compute total fatigue in terms of standard axle in 18 year period, assume traffic growth rate of 7.5% per annum and delay to opening of traffic as 2 years. 9

Axle load (kg)	ADT	Eq. Factors
1100	92	0.002
2100	131	0.003
4100	56	0.025
6100	121	0.33
8100	147	1.00
10100	32	1.70
14100	27	4.25
714000	20	7.46

3. a) Explain plate load test for evaluations of modulus of subgrade reaction and corrections to be applied. 7
- b) Estimate the group index of sub-grade soil from following data: 9
- i) Passing 425 micron = 90%
 - ii) Passing 75 micron = 70%
 - iii) Liquid limit = 45%, Plastic limit = 20%

OR

4. a) A plate load test with 30 cm diameter plate conducted on a subgrade gave the following data. 7

Deformation (mm)	Load on the plate (kg)
0.24	207
0.51	391
0.76	704
1.00	950

1.26	1354
1.52	1422
1.76	1784
2.00	1936

Estimate the modulus of subgrade reaction and discuss its application.

- b) Write short notes on Marshall method of mix design. **9**
5. a) Plate bearing test conducted with 30 cm diameter. Plate on subgrade sustained a load of 1250 kg at 0.25 cm deflection, the test when carried out on a base course of thickness 18 cm. Sustained a load of 5500 kg at 0.25 cm deflection. Design the Pavement for wheel load of 5100 kg with tyre pressure of 7.2 kg/cm^2 using Burmister's approach for an allowable deflection of 0.5 cm. **16**
- b) Draw layout of different joints in CC pavement and explain functioning of tie bar.
- OR**
6. Design a rigid pavement for a two lane highway from data given below. **16**
- i) Wheel load = 5200 kg
 - ii) Tyre Pressure = 5.5 kg/cm^2
 - iii) Grade of concrete = M30
 - iv) Modulus of subgrade reaction = 7.5 kg/cm^3
 - v) $C_x=0.9$, $C_y=0.7$
 - vi) Temperature gradient = 0.55°C/cm
 - vii) Projected traffic volume = 3000 CVD
7. a) Explain PCA method of rigid pavement. **8**
- b) Explain FAA method of flexible air pavement design. **8**
- OR**
8. a) Estimate the load factor at all the regions of run way concrete pavement of 275 mm thickness under ESWL = 20,000 kg at 10.5 kg/cm^2 tyre pressure. Assume grade of concrete M30, and 'k' for subgrade soil = 8.0 kg/cm^2 . Also locate the position of failure and draw failure pattern. **8**
- b) Explain AASHTO method of air field rigid pavement design. Derive torsion equation **8**
9. a) Write a Repair and Maintenance of flexible pavement. **8**
- b) Write a note on "Profilometer". **8**
- OR**
10. a) Following observations are recorded in Benkelmen beam deflection Investigation for a certain section of state highway 1.56, 1.46, 1.32, 1.40, 1.62, 1.55, 1.48, 1.10, 1.32, 1.48, 1.56 (Corrected values in mm). Design a high-quality bituminous overlay if maximum allowable deflection is 0.80 mm. Assume suitable layer equivalency factor. **8**
- b) What are the various types of failure in "Rigid Pavement". **8**
