

PROBLEMS

- 7-1. The results of repeated load tests on a granular material are tabulated in Table P7.1. Develop an equation relating the resilient modulus to the first stress invariant or the sum of three principal stresses.

TABLE P7.1

Confining pressure (psi)	2	5	10	20	2
Deviator stress (psi)	6	15	30	60	6
Recoverable strain (10^{-4})	5.8	7.4	9.5	11.4	6.0

- 7-2. A fine-grained soil has an unconfined compressive strength of 2.3 tsf. The results of repeated load tests are tabulated in Table P7.2. Develop an equation relating the resilient modulus to the deviator stress. What should be the maximum and minimum resilient moduli for this soil?

TABLE P7.2

Deviator stress (psi)	2	4	7	14	20	28
Recoverable strain (10^{-4})	1.41	3.20	7.61	18.90	30.32	51.81

- 7-4. An asphalt mixture has an asphalt content of 7% and a bulk specific gravity 2.24. The recovered asphalt has a specific gravity of 1.02, a ring and ball softening point of 120°F, and a penetration of 50 at 77°F. The specific gravity of the aggregate is 2.61. Determine the stiffness modulus of the mixture at a temperature of 74°F and a loading time of 0.02 s by the Shell nomographs

- 7-4. The results of fatigue tests on an asphalt treated base are shown in Table P7.4. Develop an equation relating the number of repetitions to failure and the initial tensile strain.

TABLE P7.4

Test No.	1	2	3	4	5	6	7	8
Initial strain (10^{-3})	3.15	2.61	2.49	1.92	1.59	1.27	1.09	0.873
Fracture life (N_f)	35	75	100	294	340	970	1630	3573