

4.1 The sieve analysis of 10 soils and the liquid and plastic limits of the fraction passing through the No. 40 sieve are given in the following table:

Soil	Sieve analysis, % finer			Liquid limit	Plastic limit
	No. 10	No. 40	No. 200		
1	95	79	53	36	21
2	100	95	78	65	26
3	100	80	62	35	20
4	90	55	45	28	20
5	90	71	60	40	26
6	95	65	32	25	16
7	100	55	8	—	NP
8	96	82	65	40	24
9	85	60	23	20	15
10	100	92	86	70	38

Classify the soils by the AASHTO classification system and give the group indices for each.

- 4.2 Classify the following soils using the AASHTO classification system, and give the group indices:

Soil	Sieve analysis, % finer			Liquid limit	Plastic limit
	No. 10	No. 40	No. 200		
A	62	30	8	—	NP
B	90	67	35	32	8
C	90	76	34	37	12
D	100	78	8	—	NP
E	85	68	45	38	9

- 4.3 Classify the following soils using the AASHTO classification system, and give the group indices also:

Sieve size	Percent passing				
	A	B	C	D	E
No. 4	94	98	100	100	100
No. 10	63	86	100	100	100
No. 20	21	50	98	100	100
No. 40	10	28	93	99	94
No. 60	7	18	88	95	82
No. 100	5	14	83	90	66
No. 200	3	10	77	86	45
0.01 mm	—	—	65	42	26
0.002 mm	—	—	60	47	21
Liquid limit	—	—	63	55	36
Plasticity index	NP	NP	25	28	22

- 4.4 Classify soils 1–6 given in Problem 4.1 using the Unified classification system. Give the group symbols and the group names.
- 4.5 Classify the soils given in Problem 4.3 using the Unified classification system. Give the group symbols and the group names.
- 4.6 Classify the following soils using the Unified classification system:

Soil	<u>Sieve analysis, % finer</u>		Liquid limit	Plasticity index
	No. 4	No. 200		
A	80	52	30	8
B	79	45	26	4
C	91	80	60	32
D	95	75	41	12
E	82	41	24	2

Give the group symbols and the group names.

- 4.7 For an inorganic soil, the following grain-size analysis is given:

U.S. sieve no.	Percent passing
4	100
10	90
20	64
40	38
80	18
200	13

For this soil,  $LL = 23$  and  $PL = 19$ . Classify the soil according to

- the AASHTO soil classification system,
- the Unified soil classification system. Give group names and group symbols