

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- October 2018

M.Tech. III Semester

Dr. Sawabh Rawat

COURSE CODE: 15M3WCE311

MAX. MARKS: 25

COURSE NAME: Environmental Geotechnics

COURSE CREDITS: 3

MAX. TIME: One Hour Thirty Minutes

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Assume data, if necessary. Values for Error and Complimentary error function are given in Table 1.

- [1] Using the governing equation of flow through saturated soil, derive the consolidation equation. [8]
- [2] Explain the significance of 'Moisture Characteristic Curves'. [5]
- [3] At a landfill site, dissolved chloride in a concentration of 1000 mg/L is being transported along with the leachate through a 5- ft – thick natural silty sand layer into an underlying aquifer. The flow velocity is 0.03 m/day and the effective porosity of silty sand is 0.1. What is the mass flux of chloride into the aquifer per unit base area (1 m x 1 m) of the landfill due to advection alone? [6]
- [4] At a landfill site, leachate accumulated over a 0.3 m – thick clay liner contains chloride concentration of 1000 mg/L. If the tortuosity is equal to 0.5, what would be the concentration at depth of 3 m after 100 years of diffusion? Neglect the effects of advection. [6]

Table 1: Error and complementary error function values

u	$erf(u)$	$erfc(u)$
0.00	0.0	1.0
0.05	0.0563720	0.9436280
0.10	0.1124629	0.8875371
0.15	0.1679960	0.8320040
0.20	0.2227026	0.7772974
0.25	0.2763264	0.7236736
0.30	0.3286268	0.6713732
0.35	0.3793821	0.6206179
0.40	0.4283924	0.5716076
0.45	0.4754817	0.5245183
0.50	0.5204999	0.4795001
0.55	0.5633234	0.4366766
0.60	0.6038561	0.3961439
0.65	0.6420293	0.3579707
0.70	0.6778012	0.3221988
0.75	0.7111554	0.2888446
0.80	0.7421008	0.2578992
0.85	0.7706679	0.2293321
0.90	0.7969081	0.2030919
0.95	0.8208907	0.1791093
1.00	0.8427007	0.1572993
1.10	0.8802050	0.1197950
1.20	0.9103140	0.0896860
1.30	0.9340079	0.0659921
1.40	0.9522851	0.0477149
1.50	0.9661051	0.0338949
1.60	0.9763484	0.0236516
1.70	0.9837905	0.0162095
1.80	0.9890905	0.0109095
1.90	0.9927904	0.0072096
2.00	0.9953223	0.0046777
2.10	0.9970205	0.0029795
2.20	0.9981372	0.0018628
2.30	0.9988568	0.0011432
2.40	0.9993115	0.0006885
2.50	0.9995930	0.0004070
2.60	0.9997640	0.0002360
2.70	0.9998657	0.0001343
2.80	0.9999250	0.0000750
2.90	0.9999589	0.0000411
3.00	0.9999779	0.0000221