Ref No. Ex/PG/CE/T/1210D/2019

M.E. CIVIL ENGINEERINGFIRST YEARSECOND SEMESTEREXAM 2019

COASTAL AND OFFSHORE GEOTECHNOLOGY (SMFE)

Time: Three hours **Full Marks: 100**

Use a separate Answer-Script for each part

1. Answer ALL questions.
2. Assume reasonable values of data if it is not supplied.
3. No code etc. will be needed to answer the questions of this part
4. Notations used bear their usual meanings

No. of Question	Part –I (40 Marks)	Marks
Q.1	Illustrate salient topographical features of seafloor with a neat and labelled sketch	8
Q.2	Illustrate Bathymetry and Seafloor topography.	4+4=8
Q.3	Explain the difference between behavior of dilative sand and dilative clay under cyclic loading	8
Q.4	Explain Limiting Equilibrium Method for stability analysis of a Gravity Platform with a neat sketch	8
Q.5	Discuss effects of cyclic loading on offshore piles.	8

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MASTER OF CIVIL ENGINEERING EXAMINATION 2019

(First Year, Second Semester)

COASTAL AND OFFSHORE GEOTECHNOLOGY

Time: Three Hours

Full Marks: 100

PART I: 40 Marks
PART II: 60 Marks

Use a separate Answer-Script for each part

No. of questions		PART II (60 Marks)	Marks
		*Answer any **THREE** questions from this PART. Assume suitable values for the parameters if not supplied*	
1	(a)	What are the assumptions made in tide theory?	2
	(b)	What are the forces responsible for tide generation?	2
	(c)	Define 'Equilibrium tide' and 'Daily inequality in tide'.	3x2=6
	(d)	On the line joining Earth and Moon, A and B are diametrically opposite two points on the Earth's surface, on equator. Prove that the tide producing force at A and B would be same in magnitude but opposite in direction. Neglect the Sun's Gravitational attraction.	10
2	(a)	What is called wave motion? How many types of wave motions can be seen in the ocean? Explain briefly.	2+3=5
	(b)	Define: (i) Group wave celerity; (ii) Wave steepness; (iii) Significant wave height	3x1=3
	(c)	In a wave measurements programme, the wave height and period was measured at a water depth of 9.0m as follows:	12
		Wave Height (m): 1.70, 1.69, 1.68, 1.62, 1.57, 1.60, 1.63, 1.69, 1.59, 1.48, 1.60, 1.62 Wave period (sec): 12, 11, 11, 12, 10, 10, 10, 11, 10, 9, 10, 11	
		Find the following: (i) Significant wave height; (ii) Wave celerity and group wave celerity; (iii) Wave power and energy; (iv) Wave length; (v) Breaker height and length, if breaker depth is 2.0m.	
3	(a)	What is Wave stiffness? What is the range of wave stiffness in case of wind generated waves?	1+2=3
	(b)	Two waves having same height, but different stiffness. Which of the two waves will travel faster?	3
	(c)	Discuss the motion of water particles, while transferring the energy in case of progressive wave.	3
	(d)	What are the expressions of wave speed in general, as well as, in deep water and shallow water as per surface wave theory?	3
	(e)	Discuss the assumptions made in surface wave theory.	6
	(f)	Express the group wave celerity in case of deep water and shallow water.	2
4	(a)	Define 'Freeboard' for coastal structures. Also define 'Fetch' and 'Effective Fetch'. How do you estimate 'Effective Fetch'? Explain Briefly.	2+3+3=8
	(b)	Compute 'Freeboard and the top elevation of the armoured coastal structure having life of 20 years for the following details: Mean high tide level = 2.750m RL; Maximum high tide level = 3.270m RL Effective fetch: For normal freeboard = 10.0km & minimum freeboard = 13.0km Wind velocity over water for normal freeboard = 150km/hr & minimum freeboard 50km/hr U/s slope of the structure (V:H) = 1:6 (upper part) and 1:10 (lower part) along with the following coefficients: • The upstream face surface roughness = 0.75 • The ratio of wind velocity over water surface to the wind velocity over land surface for effective fetch ≥ 10km is 1.31 • Variation of the Relative Run-up (R/H_0) against Embankment Slope is as follows:	12

Embankment slope	0.1	0.2	0.3	0.4	0.5	0.6
Relative Run-up, R/H_0	0.368	0.752	1.200	1.600	1.968	2.272

Assume sea level rise 2.0mm per year and average settlement of said structure 30mm per 10 years