Ref. No. Ex/CE/PE/B/T/422D/2022

BACHELOR OF ENGINEERING (CIVIL ENGINEERING) EXAMINATION 2022

[Forth Year; Second Semester]

Water Resources Engineering IIIE

Total Time: Four Hours for 70 Marks

Full Marks 70

Use a separate Answer-Script for each part

No. of questions		Marks
	Attempt All Questions	
1 (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)	11	10	11	12	10	9	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.

2	(a)	Define 'Freeboard' for Coastal Structures. Also define 'Fetch' and 'Effective Fetch'. How do you estimate 'Effective Fetch'? Explain Briefly.	2+3+5=10
	(b)	Compute 'Freeboard and the top elevation of the Seawall for the following details: High Water Level = 333.50m; Maximum High Water Level = 335.20m; Effective Fetch, in Case of Normal Freeboard = 3.64km & in Case of Minimum Freeboard = 3.89km; Wind velocity over land for Normal Freeboard = 145km/hr; Average Water depth: in Case of Normal Freeboard = 28.35m & in Case of Minimum Freeboard = 30.89m; Average Slope of Coastal Bank = 2.15(H):1(V) 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 2 and 4 as 1.16 and 1.24 respectively • Variation of the Relative Run-up (R/H_0) against Embankment Slope is as follows:	10

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

3	(a)	Draw a general profile of 'Coastal Zone' and indicate all labels.	8
	(b)	What are the natural shore protections? Indicate the equivalent artificial shore protection.	10
	(c)	Discuss the functions of bulk head and groin at coast.	2x1=2
4	(a)	Define: Point source and sink, Line source and sink, Littoral cell, Balanced littoral cell	4x1=4
	(b)	Draw a schematic diagram of the coastal cell for its sediment budgeting.	2
	(c)	What are the steps involved for coastal sediment budgeting? Explain briefly.	4