Total No. of Questions : 12]

SEAT No. :

P2657

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B.E. (Civil)

WAVE MECHANICS

(Semester-II) (2008 Course) (Elective-IV) (Open Elective) (401008DE)

Time : 3 Hours] *[Max. Marks :100*

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Answer any three questions from each section.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of caculator is allowed.***
6) ***Assume suitable data if necessary.***

Q1) a) Discuss the corrections required to be done in wind velocity measured 10 m above mean sea level (U_{10}). **[8]**

b) Write a short note on SWAN and MIKE: as numerical models. **[8]**

OR

Q2) a) Define fully developed sea, partially developed sea, swell, wave number, wave length, wave period, significant wave height, zero cross. Draw neat diagrams wherever necessary. **[8]**

b) What are the types numerical models. Explain any one of them in detail. **[8]**

Q3) a) Derive expression for group wave velocity. **[8]**

b) A wave with a period of 10 sec in a deep water depth of 17 m and significant wave height of 5.5 m. Find the local horizontal and vertical velocities and accelerations at an elevation of Z= –4 m below the SWL when θ=60°. **[10]**

OR

Q4) a) For a wave height of 2.5 m and 10 sec period obtain maximum horizontal and vertical displacement of water particle with mean position at

i) SWL.

ii) Sea bed. Depth of sea bed =12 m. **[10]**

b) Derive equation for celerity starting from linear dispersion relationship. **[8]**

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Q5) a) Enlist assumptions in the theory of refraction. Draw neat diagrams to explain the refraction. **[8]**

b) A wave of significant height 3.5 m and period 10 sec in deep water travels towards shore parallel to bed contours. If its crest makes an angle of 30 with bed contour of 12 m before refraction calculate wave height after crossing the contour. **[8]**

OR

Q6) a) Write a short note on shoaling, wave reflection, wave breaking, wave set up. **[8]**

b) A wave has 3m height and 7 seconds period in deep water. It travels towards shore over parallel bed contours. If its crest line makes an angle of 30 with the bed contour of 10m before refraction. Calculate the wave height after crossing this contour line. **[8]**

Q7) a) Annual data of significant wave heights collected for a site along the East coast of India is given below: **[6]**

H_s(in m)	0	1	2	3	4	5
No. of observations	1500	1020	988	522	45	12

Obtain the design H_s value corresponding to 200 years return using the Gumbel distribution.

b) Write short note on Pierson-Muskowitz Spectrum. **[4]**

c) What is long term wave height statistics? Name various distribution used to achieve the same while explaining Log Normal distribution in detail. **[6]**

OR

Q8) a) The annual maximum wave heights observed at Ratnagiri in m are as follows; 6,2.23,3.77,4.88,4.53,2.59,3.94, 3.12, 5.42, 6.96, 6.24, 4.43, 2.05, 5.23, 2.34, 1.25, 1.67, 3.45, 4.67, 4.35. Find wave height of 50 year return period. For N = 15, $\overline{y}_n$ =0.6285, S_n=1.230. **[6]**

b) Write short note on Bretschneider Spectrum. **[4]**

c) Distinguish between short term analysis-long term analysis, probability density function-probability distribution function. **[6]**

Q9) a) Draw neat figure for describing typical beach profile and explain the terms: the beach and near shore zone. **[4]**

b) What is the dynamic response to the beach? Explain two cases in details. **[6]**

c) What are the different shore protection methods, explain in detail. **[6]**

OR

Q10)a) What are the man made causes of shore line erosion, elaborate in detail. **[5]**

b) Define the sea, surf zone, currents, tides, storm surge, tsunamis. **[5]**

c) Draw sketches for pressure distribution of non breaking wave forces using Miche - Rundgren method. **[6]**

Q11)a) What are the profiles? What is profile accuracy? Mention four types of errors related to profile accuracy? **[6]**

b) What is Littoral drift? Explain how it occurs with neat diagrams. **[6]**

c) Discuss the effect of wave forces on rubble mound breakwater structures. **[6]**

OR

Q12)a) Write a note on Dean's Theory to calculate wave forces. **[6]**

b) Explain in detail two zone of littoral transport. **[6]**

c) What are the small diameter members? **[6]**

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