Total No. of Questions : 12]

SEAT No. :

P1057

[Total No. of Pages : 3

[4659]-28
B.E. (Civil Engineering)
e-MECHANICS OF WAVES
(2008 Course) (Semester-II) (401008) (Open Elective)

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

Instructions to the candidates:

1) ***Answer any three questions from Section-I and three questions from Section-II.***
2) ***Answer to the two sections should be written in separate answer booklet.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Your answer will be valued as a whole***
6) ***Use of electronic pocket calculator is allowed.***
7) ***Assume suitable data if necessary.***

SECTION-I

Q1) a) Discuss classification of waves. **[4]**

b) Define wave number, wave period, zero cross wave period. **[6]**

c) Write in detail about forecasting of waves in hurricanes. Give all the equations explaining the symbols used. **[8]**

OR

Q2) a) Discuss the process of wave generation and wave growth. **[6]**

b) Distinguish between Sea and Swell. **[6]**

c) Discuss the corrections to be applied in wind velocity measured 10 m above mean sea level. **[6]**

Q3) a) Obtain expression for pressure below sea surface. **[8]**

b) What are assumptions for linear wave theory? Explain the boundary conditions used while derive equation for potential function. **[8]**

OR

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Q4) a) Derive expression for group velocity of waves. **[4]**

b) Write short note on Stokes wave theory. **[4]**

c) For a wave of 3m height and 10 sec period obtain maximum horizontal and vertical displacement of water particle with mean position at i) Still water level ii) Sea bed. Depth of sea bed, d = 12m. **[8]**

Q5) a) What is long term wave height statistics? Name various distribution used to achieve the same while explaining Log-Normal distribution in detail. **[6]**

b) Define probability density function, probability distribution function, Joint cumulative distribution, Stationary process, Ergodic process. **[10]**

OR

Q6) a) Enlist various theoretical wave spectra. Explain any one of them in detail. **[6]**

b) Prove that $s(f) = 4\int_0^\infty R(\tau(\cos 2\pi f \tau \, d\tau$ where $s(f)$ is spectral density function, R(τ) = auto correlation. **[6]**

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

SECTION-II

Q7) a) What is wave breaking? Discuss with respect to interaction with current and solitary theory. Discuss various ways of wave breaking. **[8]**

b) What is wave refraction? List assumptions made in theory of refraction. Derive relation between deep water wave height and refracted wave height. **[10]**

OR

Q8) a) What is diffraction? Explain with neat sketch. What are the causes and effects of diffraction? Enlist the assumptions in the theory of diffraction. **[10]**

b) Write short note on wave set up and set down. **[8]**

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Q9) a) Draw sketches for pressure distribution of non breaking wave forces using Miche-Rundgren method. Write expressions for yc and yt with usual notations. **[8]**

b) Discuss how the effect of non vertical wall structures on formulae used for breaking and broken wave forces is considered. **[8]**

OR

Q10)a) Draw Minikin's wave pressure diagram. State formula for total breaking force on wall and total moment about toe. **[8]**

b) What is effect of angle wave approach on breaking or broken waves? Discuss effect of non-vertical walls on breaking and broken wave forces. **[8]**

Q11)a) Derive equation for variation of drag force along the total member length of vertical member. **[8]**

b) Discuss effect of roughness on C_D and C_M. **[4]**

c) Write short note on wave slam. **[4]**

OR

Q12)a) Derive equation for Keulegan-Carpenter number. **[8]**

b) Write short note on calculation of wave forces using Stokes' fifth order theory. **[4]**

c) What are limitations of Morrison's equation. **[4]**

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