Total No. of Questions : 12]

SEAT No. :

P3309

[Total No. of Pages : 4

[4959]-28

B.E. (Civil)

MECHANICS OF WAVES (Elective - IV (e))

(2008 Pattern)

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 the phenomenon of wave growth considering the wave frequency and wave energy. **[4]**

b) Define wave length, wave period, wave steepness. **[6]**

c) For a wind of corrected speed 26 m/s remaining constant over a fetch of 43 km obtain Hs and Ts values using Hasselmann technique, if

i) water is very deep

ii) water depth is 5.2 m **[8]**

OR

Q2) a) Discuss the process of wave decay. **[4]**

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

c) A slowly moving cyclone has a forward speed of 15 m/s passing over 30^{o} latitude. The pressure at the hurricane centre is 720 mm of Hg. Maximum wind speed occurs at 70 km from the centre. What is the wave height and period at 300 km to the right of the centre. **[8]**

P.T.O.

Q3) a) Prove that in deep water $C_0 = \frac{gT}{2\pi}$ and in shallow water $C_s = \sqrt{gd}$ with usual notations. Start with linear dispersion relationship. How to obtain C (wave velocity) and L (wave length) in intermediate water? **[8]**

b) A wave with a period 8 seconds is propagated shoreward over a uniformly sloping shelf from a depth of 300m to 3.3m. Find individual wave velocity (C) and wavelength (L) corresponding to 300 m and 3 m. **[8]**

OR

Q4) a) Write short note on choice of wave theories. **[4]**

b) Derive expression for water surface profile (η) starting with expression for velocity potential (ϕ). **[4]**

c) Derive expression for group wave velocity. Modify the formula for deep water and shallow conditions. **[8]**

Q5) a) Define wave energy spectra. What are the methods of deriving wave spectra? Explain in brief. **[6]**

b) The annual maximum wave heights observed at Chennai in m are as follows;

4, 5.23, 3.77, 5.88, 4.53, 4.59, 3,94, 3.12, 3.42, 6.96, 6.24, 4.43, 2.05, 5.23, 2.34, 1.25, 1.67, 3.45, 3.67, 2.35. Find wave height of 50 year return period. For N = 20, $\bar{y}_n$ = 0.5236, S_n = 1.0628. **[10]**

OR

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

b) What is difference between short term and long term wave statistics? Give details of Rayleigh distribution for short term statistics. **[4]**

c) Define probability density function, probability distribution function. **[6]**