B. Tech Degree III Semester Examination in Marine Engineering, March 2008

MRE 301 ENGINEERING MATHEMATICS III

Time : 3 Hours   Maximum Marks : 100

I. (a) Derive the sampling distribution of mean of samples taken from a normal population. (10)
    (b) Distinguish between parameter and statistic. (4)
    (c) The mean of a certain normal population is equal to standard error of mean of samples of 100 from that distribution. Find the probability that mean of sample of size 25 from the distribution will be negative. (6)

OR

II. (a) Obtain the regression lines for the following data :

x :	1	2	3	4	5	6	7	8
y :	10	12	16	28	25	36	41	49

(10)

(b) Fit a straight line of the form $y = a + bx$ to the data below :

x :	3	8	9	2	7	10
y :	5	9	10	1	8	7

(10)

III. (a) Distinguish between weighted and non-weighted binary codes. (10)
     (b) Define the following logic gates :
          (i)   OR gates   (ii) AND gates
          (iii) NOT gates   (iv) NAND
          (v)   NOR (10)

OR

IV. (a) State and prove De Morgan's formulae of Boolean algebra. (10)
     (b) Prove the Boolean identity :
     $$(x + y)(\overline{x} + z) = x \cdot z + \overline{x} \cdot y$$
     (10)

V. Prove that (i) $\Delta = E - 1$ (4)

(ii) $\nabla = 1 - E^{-1}$ (4)

(iii) $\delta = E^{1/2} - E^{-1/2}$ (4)

(iv) $\mu = \dfrac{1}{2}\left(E^{1/2} + E^{-1/2}\right)$ (4)

(v) $E = e^{hD}$ (4)

OR

VI. (a) Solve $y_{n+2} - 4y_n = n^2 + n - 1$ (8)

(b) Solve $y_{n+2} - 4y_{n+1} + 3y_n = 5^n$ (6)

(c) Solve $y_{n+2} + y_n = \cos n/2$ (6)

(Turn Over)

VII.   (a)   Using Lagrange's interpolation formula find the values of $y = f(x)$ when

$x = 10$ from the following table :

x	:	5	6	9	11
f(x)	:	12	13	14	16

(10)

  (b)   Obtain y(1.4) using Newton's forward interpolation formula from the following table :

x	:	1.1	1.3	1.5	1.7	1.9
y	:	0.21	0.69	1.25	1.89	2.61

(10)

OR

VIII.   (a)   Evaluate $\int_0^1 \dfrac{dx}{1+x^2}$ by trapezoidal rule and Simpson's 1/3 rule.   (10)

  (b)   Find $\dfrac{dy}{dx}$ at $x = 1.5$ from the data below :

x	:	1.5	2.0	2.5	3.0	3.5	4.0
f(x)	:	3.375	7	13.625	24	38.875	59

(10)

IX.   (a)   Design an algorithm to evaluate *sin x*.   (10)

  (b)   Calculate time complementary for finding sum of element of array.   (10)

OR

X.   (a)   Write an algorithm to find the Fibonacci series.   (10)

  (b)   Design an algorithm to evaluate the factorial of a positive integer.   (10)

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