B.Tech. Degree III Semester Examination in Marine Engineering December 2013

MRE 301 ENGINEERING MATHEMATICS III

Time: 3 Hours   Maximum Marks: 100

(5 x 20 = 100)

I. (a) Define
         (i) Population (ii) Sample (iii) Parameter
         (iv) Statistic (v) Sampling distribution
    (b) A random sample is taken from a normal population with mean 20 and S.D 5. Find the probability that sample mean is negative if the sample size is 45.

OR

II. (a) Fit a straight line to the following data.

         x: 10 15 20 25 30
         y: 12 18 22 16   5

    (b) Obtain the regression lines for the following.

         x: 1   2   3   4   5   6
         y: 20   31   42   19   10   4

III. (a) Define
         (i) NAND (ii) NOR (iii) Exclusive OR (iv) Exclusive NOR gates
     (b) Convert the Boolean expression to sum of product.
         $\left(\bar{A}+\bar{B}+\bar{C}\right)\left(A+\bar{B}+C\right)\left(\bar{A}+B+C\right)$

OR

IV. (a) Explain error detection and correction codes with examples.
    (b) Convert to the product of sum:
         $AB + \bar{B}C + \bar{A}C$

V. (a) Prove that

         (i) $\nabla E = \delta$

         (ii) $\mu^2 = 1 + \dfrac{\delta^2}{4}$

         $\Delta = \dfrac{\delta^2}{2} + \delta\sqrt{1 + \dfrac{\delta}{4}}$

OR

(P.T.O)

VI.   (a)   Solve the difference equation

(i) $y_{n+2} - 2y_{n+1} + y_n = n^2 2^n$

(ii) $y_{n+2} + 2y_{n+1} + y_n = 3_n + 5$

(iii) $y_{n+2} + y_n = \cos\dfrac{n}{2}$

VII.   (a)   Find $f(1.2)$ and $f(2)$ from the following table:

x:	1.1	1.3	1.5	1.7	1.9
$f(x)$:	0.21	0.69	0.25	1.89	2.61

(b)   Evaluate $\displaystyle\int_0^1 \frac{dx}{1+x^2}$ using trapezoidal rule and Simpson's $1/3^{rd}$ rule. Take h=0.2.

OR

VIII.   (a)   Use Newton's divided difference formula to find $f(7)$ from the following data.

$f(3)=24$, $f(5)=120$, $f(8)=504$, $f(9)=720$, $f(12)=1716$

(b)   Obtain the first and second derivatives of $\sqrt{x}$ at x=15 from the table:

x:	15	17	19	21	23	25
$\sqrt{x}$:	3.873	4.123	4.359	4.583	4.796	5

IX.   (a)   Design an algorithm to find $\cos x$ correct to 5 decimal places.

     (b)   Explain the linear search problem and evaluate its computational complexity.

OR

X.   (a)   Design an algorithm for the Fibanocci Sequence generation.

    (b)   Explain the Bubble sort algorithm and find the computational complexity of it.

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