B.Tech Degree III Semester Examination in Marine Engineering December 2011

MRE 301 ENGINEERING MATHEMATICS

Time: 3 Hours Maximum Marks: 100

$(5 \times 20 = 10)$

I. (a) Derive the sampling distribution of mean of samples taken from a normal population. (10)

(b) A random sample is taken from a normal population with mean 25 and SD 2. Find the probability that sample mean is negative, if the sample size is 50. (10)

OR

II. (a) Fix a straight line to the following data:

x :	1	2	3	4	5	6
y :	10	15	17	22	28	30

(10)

(b) In a partially destroyed laboratory records of an analysis of a correlation data, the following results are available. Variance of x is 9 and regression equations are $8x-10y+66=0$ and $40x-18y=214$. Find (i) mean of x and y (ii) SD of y (iii) correlation coefficient between x and y. (10)

III. (a) Distinguish between weighted and non-weighted binary codes. (10)

(b) Convert the following Boolean expression to sum of product:

$$\left(\overline{A}+\overline{B}+C\right)\cdot\left(A+\overline{B}+\overline{C}\right)\cdot\left(\overline{A}+B+\overline{C}\right)$$ (10)

OR

IV. (a) Define:

(i) Exclusive OR gate
(ii) NAND gate
(iii) NOR gate
(iv) Exclusive NOR gate $(4 \times 3 = 12)$

(b) State De Morgan's law. Write any two uses of it. (8)

V. Prove that

(i) $\Delta = E-1$
(ii) $\nabla = 1-E^{-1}$
(iii) $\mu = \dfrac{E^{1/2}+E^{-1/2}}{2}$
(iv) $\delta = E^{1/2}-E^{-1/2}$
(v) $E = e^{hD}$ $(5 \times 4 = 20)$

OR

VI. Solve:

(i) $y_{n+2}-2y_{n+1}+y_n = 2^n$
(ii) $y_{n+2}-4y_n = n-1$
(iii) $y_{n+2}-7y_{n+1}-8y_n = n^2+3^2$ $(6+6+8=20)$

(P.T.O.)

VII. (a) Using Newton's divided difference formula, find $f(2)$ and $f(15)$ from the following table:

x :	4	5	7	10	11	13
$f(x)$:	48	100	294	900	1210	2028

(10)

(b) Find θ at $x = 43$ and $x = 84$ from the following data:

x :	40	50	60	70	80	90
θ :	184	204	226	250	276	304

(10)

OR

VIII. (a) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by Simpson's rule and trapezoidal rule. (10)

(b) Find the first and second derivative at $x = 3$ from the following table: (10)

x :	3	3.2	3.4	3.6	3.8	4
$f(x)$:	-14	-10.032	-5.296	-0.256	6.672	14

IX. (a) Design an algorithm to find the factorial of a positive integer. (10)

(b) Explain the Bubble sort algorithm and find the computational complexity of it. (10)

OR

X. (a) Write an algorithm to find $\cos x$. (10)

(b) Explain the linear search problem and evaluate its computational complexity. (10)

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