Reg. No. ☐☐☐☐☐☐☐☐   A

B.Tech. Degree III Semester Examination in Marine Engineering December 2014

MRE 1301 ENGINEERING MATHEMATICS III

Time: 3 Hours   Maximum Marks: 100

(5 × 20 = 100)

I.   (a)   Derive the sampling distribution of mean of samples taken from a normal population.
     (b)   A random sample is taken from a normal population with mean 30 and standard deviation 4. How large a sample should be taken if the sample mean is to lie between 25 and 35 with probability 0.98?

OR

II. (a)   Fit a straight line $y = a + bx$ to the following data by the method of least squares.

x : 0   1   3   6   8

y : 1   3   2   5   4

     (b)   Identify the regression lines $3x + 4y + 12 = 0$ and $x + 5y + 13 = 0$. Hence obtain the correlation coefficient. Also find the mean of x and y.

III. (a)   Convert the Boolean expression to sum of product
$$\left(\bar{A} + \bar{B} + \bar{C}\right)\left(A + \bar{B} + \bar{C}\right)\left(\bar{A} + B + C\right).$$
     (b)   Implement "Exclusive-OR" gate using universal gates.

OR

IV. (a)   Distinguish between weighted and non-weighted binary codes.
     (b)   Find the complement of $A\bar{B} + AC + \bar{B}C$.

V.   (a)   Prove the following.
           (i) $\Delta = E - 1$
           (ii) $E = e^{hD}$
     (b) $1 + \dfrac{\delta^2}{2} = \sqrt{1 + \mu^2 \delta^2}$

OR

VI. (a)   Solve the difference equation
$$y_{n+2} - 5y_{n+1} - 6y_n = 4^n$$
$$y_\partial = 0 \qquad y_1 = 1$$
     (b) $y_{n+2} + y_n = \sin\dfrac{n}{2}$

(P.T.O.)

VII. (a) Find the value of y at $x = 21$ and $x = 28$ from the following data.

x : 20   23   26   29

y : 0.3420   0.3907   0.4384   0.4848

   (b) Using Lagranges formula find $f(4)$, given $f(2) = 1.5713$, $f(3) = 1.5719$

$f(5) = 1.5738$ and $f(6) = 1.5751$

OR

VIII. (a) Evaluate $\int\limits_{0}^{1} \dfrac{dx}{1+x^2}$ by trapezoidal rule and Simpson's $\dfrac{1}{3}$ rule.

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

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

IX. (a) Explain bubble sort algorithm and find its computational complexity.

   (b) Design an efficient algorithm to evaluate $\cos x$.

OR

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

   (b) Write an algorithm to find Fibanocci series.

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