

B. Tech Degree III Semester Examination in Marine Engineering December 2010

MRE 301 ENGINEERING MATHEMATICS - III

Time : 3 Hours

Maximum Marks : 100

- I. (a) Define the terms
 (i) Population (ii) Sample
 (iii) Statistic (iv) Parameter
 (v) Sampling distribution (10)
- (b) A random sample of size 400 is taken from a normal population with mean 20 and SD 4. Find the probability that the sample mean is negative. (10)
- OR**
- II. (a) Fit a straight line of the form $y = a + bx$ to the following data.
- | | | | | | | |
|---|---|----|----|----|----|----|
| x | : | 10 | 15 | 20 | 25 | 30 |
| y | : | 5 | 8 | 12 | 7 | 3 |
- (10)
- (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 . (10)
- III. (a) State and prove DeMorgan's law of Boolean algebra. (8)
 (b) What do you mean by OR gate, NOT gate and AND gate? (6)
 (c) Simplify $XY + \bar{X}Y + \bar{X}\bar{Y}$. (6)
- OR**
- IV. (a) Prove that $(A + B).(A + C) = A + (B.C)$ (6)
 (b) Simplify the Boolean expression $A + B(A + B) + A(A' + B)$. (6)
 (c) Find the complement of the Boolean expression
 (i) $ab' + ac + b'c$
 (ii) $x(y'z' + yz)$ (8)
- V. (a) Prove the following
 (i) $\Delta = E - 1$ (3)
 (ii) $\nabla = 1 - E^{-1}$ (3)
 (iii) $E = e^{hD}$ (4)
 (iv) $1 + \frac{\delta^2}{2} = \sqrt{1 + \mu^2 \delta^2}$ (5)
- (b) Calculate the difference table for the following data.
- | | | | | | | |
|--------|---|----|----|----|----|----|
| x | : | 1 | 2 | 3 | 4 | 5 |
| $f(x)$ | : | 28 | 35 | 52 | 40 | 16 |
- (5)

OR**(P.T.O)**

- VI. Solve the difference equation.
- (i) $y_{n+2} - 4y_n = 2^n$ (6)
- (ii) $(\Delta^2 + \Delta + 1)y = x^2$ (7)
- (iii) $y_{n+2} - 7y_{n+1} + 12y_n = \text{Cos } n$ (7)
- VII. (a) Use Lagrange formula to evaluate $y(10)$ from the following table.
- | | | | | | |
|---|---|----|----|----|----|
| x | : | 5 | 6 | 9 | 11 |
| y | : | 12 | 13 | 14 | 16 |
- (10)
- (b) Evaluate $\int_0^1 \frac{dx}{1+x}$ by trapezoidal rule and Simpson's $\frac{1}{3}$ rule. (10)
- OR**
- VIII. (a) Find $f(8)$ from the following data
- | | | | | | | | |
|---|---|---|----|----|----|----|----|
| x | : | 0 | 5 | 10 | 15 | 20 | 25 |
| y | : | 7 | 11 | 14 | 18 | 24 | 32 |
- (10)
- (b) Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 0$ from the following table.
- | | | | | | | |
|--------|---|--------|--------|--------|--------|--------|
| x | : | 0.0 | 0.5 | 1.0 | 1.5 | 2.0 |
| $f(x)$ | : | 0.3989 | 0.3521 | 0.2420 | 0.1295 | 0.0540 |
- (10)
- IX. (a) Design an algorithm to evaluate $\text{Sin } x$.
- (b) Show that the sequence of steps in using a bubble sort algorithm to arrange numbers in ascending order in the list 8,9,3,5 and 7. } (20)
- OR**
- X. (a) Show all steps to merge two lists 3,4,8 and 2,5,6. } (20)
- (b) Write an algorithm to find factorial of a positive integer.
- (c) Calculate the time complexity of algorithm to implement matrix multiplication. }