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***B.Tech. Degree III Semester Examination in
Marine Engineering December 2017***

**MRE 1301 ENGINEERING MATHEMATICS III
(2013 Scheme)**

Time: 3 Hours

Maximum Marks: 100

(5 × 20 = 100)

- I. (a) Calculate the correlation coefficient for the following data. (10)

x	:	5	10	15	20	25	30	35	40
y	:	8	12	16	23	31	42	15	6

- (b) If \bar{x} is the mean of a random sample of size n from a normal population with mean μ and variance 100. Find n so that $P[\mu - 5 < \bar{x} < \mu + 5] = 0.954$. (10)

OR

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

- (b) Fit a straight line of the form $y = ax + b$ to the following data. (10)

x	:	2	4	6	8	10	12
y	:	5	12	16	18	22	11

- III. (a) Define absolute error, relative error and percentage error. (10)

- (b) Find a root of the equation $x^2 - 2x + 3 = 0$ using bisection method. (10)

OR

- IV. (a) Design a combinatorial circuit for the Boolean expression

(i) $(x_1 \vee x_2) \wedge x_2$ (5)

(ii) $(x \wedge \bar{y}) \vee (\bar{x} \wedge y)$ (5)

- (b) Find a root of the equation $x^2 - 4x - 9 = 0$ by Newton-Raphson method. (10)

- V. Prove the following:

(a) $\delta = E^{1/2} - E^{-1/2}$ (5)

(b) $\Delta = \frac{\delta^2}{2} + \delta \sqrt{1 + \frac{\delta^2}{4}}$ (10)

(c) $\mu = \frac{E^{1/2} + E^{-1/2}}{2}$ (5)

OR

- VI. Solve the difference equation:

(a) $y_{n+2} - 4y_n = 2^n$. (7)

(b) $y_{n+2} + 5y_{n+1} + 6y_n = \cos n/2$. (7)

(c) $y_{n+2} - 3y_{n+1} + 4y_n = 0$. (6)

(P.T.O.)

- VII. (a) The following table gives the velocity v of a particle at time t . (10)

t	:	0	2	4	6	8	10	12
v	:	4	6	16	34	60	94	136

Find the distance moved by the particle in 12 seconds.

- (b) Apply Newton's divided difference formula to evaluate $f(5)$ from the following table: (10)

x	:	0	10	15	20	30	36
y	:	45	52	100	120	118	202

OR

- VIII. (a) Find the first and second derivative at $x = 2$ from the following table. (10)

x	:	1	2	3	4	5	6
y	:	10	18	20	24	36	40

- (b) Apply Stirling's formula to evaluate $y(35)$ if (10)

$$y(20) = 14, y(30) = 25, y(40) = 35, y(50) = 120.$$

- IX. (a) Design an algorithm to evaluate e^x . (10)

- (b) Explain the linear search problem. (10)

OR

- X. (a) Write an algorithm to find the factorial of a positive integer. (10)

- (b) Evaluate the computational complexity of a bubble sort algorithm. (10)
