

**INDIAN MARITIME UNIVERSITY**  
(A CENTRAL UNIVERSITY, GOVT. OF INDIA)  
**End Semester Examination December 2018**  
**B. Tech. (Marine Engineering)**  
**Semester - III**  
**Computational Mathematics (UG11T2301)**

Date: 27-12-2018  
Time: 3 Hrs.

Max Marks: 100  
Pass Marks: 50

**PART-A**

**Marks: 10 x 3 = 30**

**(All Questions are compulsory)**

1.
  - a. The equations of regression lines are  $y = 0.5x + a$  and  $x = 0.4y + b$ . Calculate the coefficient of correlation.
  - b. What are the normal equations to fit a curve  $y = ab^x$  by least square method?
  - c. Prove  $E = e^{hD}$
  - d. Calculate  $\int_0^1 \frac{dx}{1+x^2}$  by Simson's  $\frac{1}{3}$ rd rule taking  $h = 0.25$ .
  - e. Evaluate  $\Delta(\tan^{-1} x)$
  - f. Show that  $x.(x + y) = x$
  - g. Construct a polynomial for the following data

x	:	4	6	8	10
y	:	1	3	8	16
  - h. Construct a truth table for  $(p \vee q) \vee \sim p$
  - i. Solve  $y_{n+2} - 4y_{n+1} + 3y_n = 5^n$
  - j. Solve  $y_{n+3} - 2y_{n+2} - 5y_{n+1} + 6y_n = 0$

**PART-B**

**Marks: 5 x 14 = 70**

**(Answer any 5 of the following 7 questions)**

2. a. Fit a straight line to the following data

x	:	1	2	3	4	5	6	7	8	9
y	:	9	8	10	12	11	13	14	16	5

b. Find the least square fit of the form  $y = a + bx^2$  to the following data

x	-1	6	1	2
y	2	5	3	0

(7 + 7 marks)

3. a. Find the rank correlation for the following data

X	56	42	72	36	63	47	55	49	38	42	68	60
y	147	125	160	118	149	128	150	145	115	140	152	155

b. Two random variables have the regression lines with equations  $3x + 2y = 26$  and  $6x + y = 31$ . Find the mean values and the correlation coefficient between x and y. (7 + 7 marks)

4. a. Prove that  $u_0 + u_1x + u_2x^2 + \dots \infty =$

$$\frac{u_0}{1-x} + \frac{x\Delta u_0}{(1-x)^2} + \frac{x^2\Delta^2 u_0}{(1-x)^3} + \dots \infty$$

Hence sum the series  $1.2 + 2.3x + 3.4x^2 \dots \infty$

b. Find missing values in the following data:

X	45	50	55	60	65
y	3.0	?	2.0	?	-2.4

(7 + 7 marks)

5. a. A curve passes through the point (0,18), (1,10), (3, -18), (6, 90). Find the equation of the curve.

b. Solve  $y_{n+2} - 4y_n = n^2 + n + 1$  (7 + 7 marks)

6. a. The integers 0,1,1,2,3,5,8,13,21 ... are said to form a Fibonacci sequence. Form the Fibonacci difference equation and solve it.

b. A solid of revolution is formed by rotating about the axis, the area between the x axis, the lines  $x=0$  and  $x=1$  and a curve through the points with the following co-ordinates.

x	0.00	0.25	0.50	0.75	1.00
y	1	0.9896	0.9589	0.9089	0.8415

Estimate the volume of the solid formed using Simpson's rule.

(7 + 7 marks)

7. a. Show that  $(x \wedge y) \vee (x' \wedge x) = (x' \vee y) \wedge (x \vee z)$

b. Simplify  $(x + y) \cdot x' \cdot y'$  (7 + 7 marks)

8. a. Write an algorithm to find factorial of a numbers.

b. Write an algorithm to sum the series of  $\sin x$ . (7 + 7 marks)

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