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 Max Marks: 100

Time: 3 Hrs. 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 $(p \vee q) v \sim p$

   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 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 $u_0 + u_1x + u_2x^2 + \ldots \infty =$

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

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

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∧y) ∨ (x′∧x) = (x′ ∨ y) ∧ (x ∨ z)

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

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

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

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