

INDIAN MARITIME UNIVERSITY
(A Central University Government of India)
END SEMESTER EXAMINATIONS-June/July 2019
B.Tech (Marine Engineering)
Semester-III

Computational Mathematics (UG11T1301 / UG11T2301)

Date: 09-07-2019

Maximum Marks: 100

Duration: 3 hrs

Pass Marks: 50

- Note:**
- i. Use of approved type of scientific calculator is permitted.
 - ii. The symbols have their usual meanings.

Section-A(3x10=30 Marks)

(All Questions are Compulsory)

- Q.1 (a) What are the normal equations to fit the parabola $y = a + bx + cx^2$.
- (b) Prove $x + (x \cdot y) = x$
- (c) Using Newton's Forward Difference, find the polynomial for

x:	0	1	2	3
f(x):	1	2	1	10

- (d) Evaluate $\Delta(\tan^{-1}x)$
- (e) Prove $\Delta^3 y_2 = \nabla^3 y_5$.
- (f) The two Regression equations of the variables x and y are $x = 19.13 - 0.87y$ and $y = 11.64 - 0.50x$. find mean of x and mean of y .
- (g) Construct the Truth Table for $(p \rightarrow q) \wedge (q \rightarrow p)$.
- (h) Evaluate $\int_0^1 \frac{dx}{1+x}$ using Trapezoidal rule, taking $h = 0.2$
- (i) Explain about Bubble sort problem with suitable example.
- (j) Solve $u_{n+2} - 4u_{n+1} + 4u_n = 2^n$

Section – B (14 x5=70 Marks)

(Answer any 5 of the following)

Q.2 (a) Show that $(x \vee y) \wedge (y \vee z) \wedge (z \vee x) = (x \wedge y) \vee (y \wedge z) \vee (z \wedge x)$. (7 marks)

(b) Simplify $x \vee y \wedge y \vee z \wedge y \vee z'$. (7 marks)

Q.3 (a) The table gives the distances in nautical miles of the visible horizon for the given heights in feet above the earth's surface

x =height:	100	150	200	250	300	350	400
y =distance:	10.63	13.03	15.04	16.81	18.42	19.90	21.27

Find the value of y when $x = 218 \text{ ft}$ (7 marks)

(b) Using Lagrange's Formula, find the value of y when $x = 10$ for

$x :$	5	6	9	11
$y :$	12	13	14	16

 (7 marks)

Q.4 (a) Given that

$x :$	1.0	1.1	1.2	1.3	1.4	1.5	1.6
$y :$	7.989	8.403	8.781	9.129	9.451	9.750	10.031

Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1.1$ (7 marks)

(b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's $3/8^{\text{th}}$ rule, taking $h = \frac{1}{6}$. (7 marks)

Q.5 (a) Fit a straight line $y = a + bx$ using method of least squares for the data

$x :$	1	3	4	6	8	9	11	14
$y :$	1	2	4	4	5	7	8	9

(7 marks)

(b) Find the least squares fit of the form $y = a_0 + a_1x^2$ using method of least squares for the data

$x :$	-1	0	1	2
$y :$	2	5	3	0

(7 marks)

- Q.6 (a) Ten participants in a contest are ranked by two judges as follows:

x :	1	6	5	10	3	2	4	9	7	8
y :	6	4	9	8	1	2	3	10	5	7

Calculate the rank correlation coefficient ρ (7 marks)

- (b) Find the Correlation Coefficient between x and y from the given data

x :	55	56	58	59	60	60	62
y :	35	38	38	39	44	43	45

(7 marks)

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

- (b) In a partially destroyed laboratory record, only the lines of regression of y on x and x on y are available as $4x - 5y + 33 = 0$ and $20x - 9y = 107$ respectively. Calculate $\bar{x}, \bar{y}$ and the coefficient of correlation between x and y . (7 marks)

- Q.8 (a) Write an algorithm to find an exponential series e^x

(7 marks)

- (b) Write an algorithm to find the factorial value of n numbers. (7 marks)