Indian Maritime University

(A Central University, Govt of India)

May-June 2018 End Semester Examinations

B. Tech (Marine Engineering)

Semester-III

Computational Mathematics(UG11T2301 /T1301)

Date: 02.07.2018 Max Marks:100 Marks

Time: 3 Hrs Pass Marks: 50 Marks

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

Section –A (3× 10 = 30 marks)

Q 1

a) Prove with usual notations that: $hD = \log(1 + \Delta)$

b) What do you mean by interpolation? Write and explain three interpolation formulae.

c) Solve $u_{n+2} - 4u_{n+1} + 4u_n = 2^n$

d) Find the area under the curve $y = \frac{1}{2x+3}$ bounded by X axis and ordinates x = 0 and x = 6.

e) Explain Rank correlation coefficient with formula and when it is used ?

f) If the lines of regression of y on x and x on y are $4x - 5y + 33 = 0$ and $20x - 9y = 107$, find mean of variables x and y. Also find the two regression coefficients.

g) The pressure and volume are related by the relation $pv^{\gamma} = k$. Write the equations required to solve to fit the curve passing through given set of values of p and v.

h) If $f(x) = e^{ax+b}$, show that it's leading differences form a geometric progression.

i) Write the algorithm for expansion of $sinx$ in ascending powers of x.

j) Explain bubble sort method with suitable example.

Section –B (14× 5 = 70 marks)

(Answer any 5 of the following)

Q 2 (a and b carry 7 marks each)

a) Solve the difference equation: $y_{n+2} - 4y_n = n^2 + n - 1$

b) Prove that : $u_0 + \frac{u_1 x}{1!} + \frac{u_2 x^2}{2!} + \frac{u_3 x^3}{3!} + \cdots \ldots = e^x(u_0 + x\,\Delta u_0 + \frac{x^2}{2!}\Delta^2 u_0 + \frac{x^3}{3!}\Delta^3 u_0 + \cdots.)$

Q 3 (a and b carry 7 marks each)

a) From the following table , estimate the number of students who obtained marks between 40 and 45:

Marks	30-40	40-50	50-60	60-70	70-80
No. of students	31	42	51	35	31

b) Using Lagrange's formula , express the function $\frac{3x^2+x+1}{(x-1)(x-2)(x-3)}$ as a sum of partial fractions.

Q 4 (a and b carry 7 marks each)

a) Predict the radiation dose at an altitude of 3000 feet by fitting an exponential curve $y = ab^x$

Where a and b are constants, by using following data:

Altitude(x)	50	450	780	1200	4400	4800	5300
Dose of radiation(y)	28	30	32	36	51	58	69

b) Evaluate using Simpson's 1/3 rd rule using 6 sub-intervals $\int_0^{\pi/2} \sqrt{sinx}\ dx$

Q 5 (a and b carry 7 marks each)

a) Calculate the coefficient of rank correlation between masks assigned to ten students by judges X and Y in a certain competitive test as shown below

Sr.no.	1	2	3	4	5	6	7	8	9	10
Marks by X	52	53	42	60	45	41	37	38	25	27
Marks	65	68	43	38	77	48	35	30	25	50

by Y										

b) Prove that: $-1 \leq r \leq 1$, where r is the correlation coefficient.

Q 6 (a and b carry 7 marks each)

a) Write an algorithm for finding factorial of positive integer N > 0

b) $If\ a \vee x = b \vee x\ and\ a \vee x' = b \vee x', then\ prove\ that\ a = b$

Q 7

a) Show that : $(x \wedge y) \vee (x' \wedge z) = (x' \vee y) \wedge (x \vee z)$ (4 marks)

b) Show that : $[x \cdot (x' + y)] + [x' \cdot (x + y)] = y$ (4 marks)

c) Draw the circuit for the Boolean function: $[(p_1 \vee p_2) \vee (p_1 \vee p_3)] \wedge (p_1 \wedge p_2')$, then simplify the function and draw the diagram of simplified resulting circuit. (6 marks)

Q 8 (a and b carry 7 marks each)

a) For 10 observations on price (x) and supply (y) of a commodity , the following data was obtained : $\Sigma x = 130$, $\Sigma y = 220$, $\Sigma x^2 = 2288$, $\Sigma y^2 = 5506$, $\Sigma xy = 3467$. Find the value of correlation coefficient. Also find the equation of regression line of price on supply.

b) If P is the pull required to lift a load W by means of a pulley block , find the linear law of the form P = m W + c (A line fitting in given values) connecting P and W , using the following data:

P	12	15	21	25
W	50	70	100	120

Where P and W are taken in kg-wt. Compute P when W = 150 kg-wt.

****