Indian Maritime University

(A Central University, Govt of India)

May-June 2018 End Semester Examinations

B Sc (Nautical Science)

Semester-III

Applied Mathematics-IV (UG21T2303)

Duration:3 Hrs | Max Marks:70 Marks

Date: 06.07.2018 | Pass Marks:35 Marks

Note: Answer any Seven questions out of Nine Questions.

All questions carry equal marks.

Q.1 a) Develop a recurrence formula for finding $\frac{1}{\sqrt{N}}$ using Newton Raphson method and hence compute to three decimal places $\frac{1}{\sqrt{14}}$.

(5 Marks)

b) Solve the following equations by Gauss –Jordan method :

$$2x - 3y + z = -1\,, x + 4y + 5z = 25\,, 3x - 4y + z = 2.$$

(5 Marks)

Q.2 a) Express $x^3 - 2x^2 + x - 1$ into factorial polynomial .Hence show that $\Delta^4 f(x) = 0$. (5 Marks)

b) Estimate the missing value in the following data:- (5 Marks)

x	0	1	2	3	4
f(x)	1	3	9	--	81

Q.3 a) Find the number of men getting wage of Rs.10 from the following table:-

Wages in Rs.	5	15	25	35
No.of Men	9	30	35	42

(5 Marks)

b) Given the values

X	5	7	11	13	17
f(x)	150	392	1492	2366	5202

Estimate $f(9)$ using Lagranges formula. (5 Marks)

Q.4 a) A curve is drawn to pass through the points given by the following table:

x	1	1.5	2	2.5	3	3.5	4
y	2	2.4	2.7	2.8	3	2.6	2.1

Estimate the area bounded by the curve , x-axis and the lines $x = 0 \; and \; x = 4$.

(5 Marks)

b) Evaluate $\int_0^1 \frac{dx}{1+x}$ applying Simpson's (3/8)th rule. (5 Marks)

Q.5 a) Using Stirling formula find y_{35} given, $y_{20} = 512 \, , y_{30} = 439, y_{40} = 346 \, , y_{50} = 243$.

(5 Marks)

b) Find the polynomial interpolating the data :- (5 Marks)

x	0	1	2
f(x)	0	5	2

Q.6 a) Compute the line integral $\int_C (y^2 dx - x^2 dy)$ about the triangle whose vertices are (1,0),(0,1) and (-1,0). (5 Marks)

b) Evaluate $\int_C [(x^2 - 2xy)dx + (x^2 y + 3)dy]$ around the boundary of the region defined by $y^2 = 8x \; and \; x = 2$. (5 Marks)

Q.7 a) Evaluate $\int_C F.dR$ where $F = (x^2 + y^2)i - 2xy \, j$ and C is the rectangle in the xy-plane bounded by $y = 0 \, , x = a \, , y = b, x = 0$. (5 Marks)

b) Use Divergence theorem to evaluate $\int_S F.ds$ where $F = x^3 i + y^3 j + z^3 k$ and S is the surface of the sphere $x^2 + y^2 + z^2 = r^2$. (5 Marks)

Q.8 a) Find the total work done in moving a particle in a force field given by $F = 3xy \, i - 5z \, j + 10x \, k$ along the curve $x = t^2 + 1 \; , y = 2t^2 \; , z = t^3$ from $t = 1 \; to \; t = 2.$ (5 Marks)

b) Using Green's theorem, evaluate $\int_C [(y - \sin x)dx + \cos x \, dy]$ where C is the plane triangle enclosed by the lines $y = 0, x = \frac{\pi}{2} \; and \; y = \frac{2}{\pi} x$.

(5 Marks)

Q.9 a) If $F = (2x^2 - 3z)i - 2xy\,j - 4x\,k$,then evaluate $\iiint_V \nabla . F\, dv$ where V is bounded by $x = y = z = 0$ and $2x + 2y + z = 4$. (10 Marks)
