INDIAN MARITIME UNIVERSITY

(A Central University, Govt.of India)

END SEMESTER EXAMINATIONS-JUNE/JULY 2019

DIPLOMA IN NAUTICAL SCIENCE

SEMESTER I

APPLIED MATHEMATICS

(UD11T4101)

Date: 24.06.2019 **Max.Marks:70**

Time: 2 Hrs. **Pass Marks: 35**

NOTE: Question no. 1 & 2 are compulsory.
Answer any 5 out of remaining 8 questions.
All questions carry equal marks.
Use of Non programmable Scientific Calculator is permitted.
Exam centers to supply 'Graph Sheets' to candidates (if found required)

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1. a) In the spherical triangle PQR, $angle\ P = 53°5',\ side\ r = 70°20'\ and\ side\ q = 110°14'$ Calculate angle Q.

b) In the spherical triangle PVM, $side\ v = 92,\ side\ m = 51°55'\ and\ angle\ V = 90°$. Calculate angle P. (5+5 marks)

2. a) In the spherical triangle DEF, $angle\ D = 85°30',\ angle\ E = 100°29.6'$ and $side\ f = 49°34'$. Calculate angle F.

b) In the spherical triangle PQR, $side\ p = 73°5',\ side\ q = 90°\ and\ side\ r = 79°12'$. Calculate angle P. (5+5 marks)

3. a) A particle is acted on by constant forces $3i + 2j + 5k\ \ and\ \ 2i + 2j - 3k$ and is displaced from a point whose position vector is $2i - j - 3k$ to a point whose position vector is $4i - 3j + 7k$. Calculate the work done.

b) Find the constant $'\lambda'$ so that the two vectors $\bar{a} = i + (2\lambda - 1)j + 3k$ and $\bar{b} = -3i + 2j - 2k$ are perpendicular. (5+5 marks)

4. Solve the linear programming problem by graphical method:

a) Maximize : $Z = 9x + 13y$ subject to

$$2x + 3y \leq 18$$

$$2x + y \leq 10$$

$$x \geq 0\ ;\ y \geq 0$$

b) Minimize : $Z = 3x + 5y$ subject to

$x \leq 4$

$y \geq 2$

$2x + 3y \geq 12$

$6x - 5y \leq -6$ and $x \geq 0 ; y \geq 0$ (5+5 marks)

5 a) Find the equation of the standard ellipse whose length of latus reatum =5 and eccentricity = $\frac{2}{3}$.

b) Find the equation of the circle with the certre at (1,-2) and touching the line 4x-3y+5=0. (5+5 marks)

6. a) How many solid spheres, each of diameter 6 cm. can be made by melting a solid metal cylinder of height 45 cm. and diameter 4 cm.

b) The length of a hall is 24 m and its width is 16 m. If the lateral surface area of the hall is two –third of the sum of the areas of the roof and the floor ,find its height. (5+5 marks)

7. a) Evauate $\int_0^6 \frac{dx}{1+x^2}$ by using Simpson's $\frac{1}{3}^{rd}$ rule.

b) Using Simpson's 3/8th rule calculate approximate value of $\int_{-3}^{3} x^4 \, dx$ by taking 7 equidistant ordinates. (5+5 marks)

8. a) The angles of elevation of the top of a tower from 2 points at a distance of 4 m. and 9 m. from the base of the tower and in the same straight line with it are complementary. Find the height of the tower.

b) From a point on the roof of a house ,11m high it is observed that the angles of depression of the top and foot of the lamppost are $30°$ and $60°$ respectively. What is the height of the lamp post.

(5+5 marks)

9. a) Suppose x varies jointly with y and the square root of z.

When x=-18,y=2 then z=9.Find the value of y when x=10 and z=4.

b) The volume of sphere varies directly as the cube of its radius .The volume of the sphere is 36π cc. when the radius is 3 cm. Find the volume of the sphere when the radius is 5 cm. (5+5 marks)

10. a) Find the cubic polynomial which takes the following values:-

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

b) Using Lagrange's interpolation formula to calculate the profit in the year 2000 from the following data:

Year	1997	1999	2001	2002
Profit in lakhs	43	65	159	248

(5+5 marks)
