

INDIAN MARITIME UNIVERSITY
(A Central University, Government of India)
End Semester Examination Dec 2019/Jan 2020
DNS – DIPLOMA IN NAUTICAL SCIENCE
Semester -I
UD11T4101- APPLIED MATHEMATICS

Date: 09.12.2019

Max Marks: 70

Time: 2 Hours

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 approved type Scientific Calculator is permitted.

Exam Centres to supply 'Graph Sheets' to candidates (if found required)

1. (2 x 5 = 10 Marks)
 - a. In spherical triangle PQR , $p = 62^\circ 10.1'$, $q = 111^\circ 35.2'$, $r = 63^\circ 33'$.
Calculate P
 - b. In spherical triangle LMN , $M = 33^\circ 14.0'$, $m = 80^\circ 05'$, $n = 70^\circ 12'$.
Calculate N

2. (2 x 5 = 10 Marks)
 - a. In spherical triangle PZX , right angled at Z , $p = 110^\circ 20'$ and $z = 84^\circ 12'$. Find the value of x.
 - b. In spherical triangle PQR, $PQ = 52^\circ 11'$, $Q = 69^\circ 47'$ and $QR = 90^\circ$.
Calculate P

3. (2 x 5 = 10 Marks)
 - a. Find the cosine of the angle between the vectors \bar{a} and \bar{b} where
 $\bar{a} = \hat{i} - 2\hat{j} + \hat{k}$ and $\bar{b} = 2\hat{i} - 2\hat{j} + 2\hat{k}$.
 - b. Find the work done by the force $\bar{F} = 3\hat{i} + 2\hat{j} - 4\hat{k}$ acting at a point A(1, -2, -3) which is displaced to the point B(4, 3, -2)

4. (2 x 5 = 10 Marks)
 - a. Use graphical method of LPP to Maximize $Z = 3x_1 + 4x_2$
Subject to the constraints $x_1 + x_2 \leq 450$, $2x_1 + x_2 \leq 600$,
 $x_1, x_2 \geq 0$
 - b. Use Graphical method of LPP to
Maximize $5x_1 + 3x_2$
Subject to: $x_1 + x_2 \leq 2$, $5x_1 + 2x_2 \leq 10$, $3x_1 + 8x_2 \leq 12$, $x_1, x_2 \geq 0$

5. (2 x 5 = 10 Marks)
- Find the equation of the circle with centre at (2,-1) and which passes through the point (3,6).
 - Find the equation of the parabola with vertex at the origin and passing through the point P(3,-4) and symmetric about the Y-axis.

6. (2 x 5 = 10 Marks)
- Find the volume of a sphere with a radius of 12.
 - Find the area of a parallelogram with a base of 12 cm. and a height of 5 cm.

7. (2 x 5 = 10 Marks)
- A solid of revolution is formed by rotating about the x-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	1.0000	0.9896	0.9589	0.9089	0.8415

Estimate the volume of the solid formed using Simpson's 1/3 Rule.

- Evaluate $\int_0^6 \frac{dx}{1+x^2}$ using Simpson's 1/3 Rule.
8. (2 x 5 = 10 Marks)
- The angle of elevation of the top of the building at a distance of 50 m from its foot on a horizontal plane is found to be 60 degree. Find the height of the building.
 - A ladder placed against a wall such that it reaches the top of the wall of height 6 m and the ladder is inclined at an angle of 60 degree. Find how far the ladder is from the foot of the wall.
9. (2 x 5 = 10 Marks)
- The volume of a globe varies as the cube of its radius. Three solid globes of diameters $3/2$, 2 and $5/2$ metres are melted and formed into a new solid globe. Find the diameter of the new globe.

- b. A tub can be filled in 8 minutes using the cold water tap and in 10 minutes using the hot water tap. How long will it take to fill the tub using both the taps ?

10.

(2 x 5 = 10 Marks)

- a. Find the number of men getting wage of Rs.10 from the following table, using Newton's forward interpolation formula

Wages(x) in Rs.	5	15	25	35
No.of men (y)	9	30	35	42

- b. Find the area of a circle of diameter 105 from the following table using Newton's backward interpolation formula.

Diameter (x)	80	85	90	95	100
Area (y)	5026	5674	6362	7088	7854
