

INDIAN MARITIME UNIVERSITY
(A Central University, Government of India)

May/June End Semester Examinations
B.Sc. (Nautical Science) First Semester
(AY 2013– 2016 batches only)

Nautical Mathematics - I (UG21T2103)

Date : 07.06.2017

Time: 3 Hrs

Maximum Marks: 70

Pass Marks : 35

Note: Answer any SEVEN Questions.

All questions carry equal marks. (7 x 10 = 70 marks)

1. In spherical triangle CDE , Calculate the angles C , D and E if sides
 $c = 87^\circ 10'$ $d = 62^\circ 37'$ and $e = 100^\circ 10'$.

(10 marks)

2. In spherical triangle RST side $t = 80^\circ 32'$, side $r = 60^\circ 40'$ and angle
 $T = 90^\circ$. Calculate angles S and R and side s .

(10 marks)

3. In spherical triangle ABC side $a = 69^\circ 9'$, side $c = 90^\circ$ and angle $C =$
 $117^\circ 11'$. Calculate angles A and B and side b .

(10 marks)

4. In spherical triangle ABC angles A , B , C are $81^\circ 24' 18''$; $61^\circ 31' 42''$; $102^\circ 58'$
respectively. Calculate sides a, b, c

(10 marks)

5. a. Find the volume generated by revolving the portion of the parabola
 $y^2 = 4ax$ cut off by its latus rectum about the axis of the
parabola.

- b. Find the volume of a sphere of radius a by integration.

(5+5 marks)

6. a. Evaluate $\int_0^1 \int_{e^x}^e \frac{dy dx}{\log y}$ by changing the order of integration.
 b. Evaluate $\iint xy (x + y) dx dy$ over the area between $y = x^2$ and $y = x$.
 (5+5 marks)
7. a. Evaluate $\int_0^a \int_0^b \int_0^c (x^2 + y^2 + z^2) dx dy dz$
 b. Find the area between the parabolas $y^2 = 4ax$ and $x^2 = 4ay$.
 (5+5 marks)
8. a. Evaluate $\iiint (x + y + z) dz dy dx$ over the tetrahedron founded by the planes $x = 0, y = 0, z = 0, x + y + z = 1$
 b. Prove $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$
 (6+4 marks)
9. a. Prove $\int_0^1 \frac{dx}{\sqrt{1+x^4}} = \frac{1}{4\sqrt{2}} \beta\left(\frac{1}{4}, \frac{1}{2}\right)$
 b. Evaluate $\int_0^1 \frac{dx}{\sqrt{1-x^4}}$
 (5+5 marks)
