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

May/June 2017 End Semester Examinations
Diploma in Nautical Science DNS)
First Semester (From 2009-2012 batch only)

Applied Mathematics (UD11 T1101)

Date : 15.06.2017 **Maximum Marks: 70**
Time: 2 Hrs **Pass Marks : 28**

NOTE: ATTEMPT ANY 5 QUESTIONS. USE OF CALCULATOR IS PERMITTED

1. a) Find the area of a parallelogram whose adjacent sides are given by the vectors.
$\vec{a} = 3\hat{\imath} + \hat{j} + 4\,\hat{k}$ and $\vec{b} = \hat{\imath} - \hat{j} + \hat{k}$. (7 Marks)

b) If $\hat{\imath} + \hat{j} + \hat{k}$, $2\hat{\imath} + 5\,\hat{j}$, $3\,\hat{\imath} + 2\,\hat{j} - 3\,\hat{k}$ and $\hat{\imath} - 6\,\hat{j} - \hat{k}$ are the position vectors of Points A, B,C and D respectively then find the angle between $\overrightarrow{AB}$ and $\overrightarrow{CD}$.Deduce that $\overrightarrow{AB}$ and $\overrightarrow{CD}$ are collinear. (7 Marks)

2. a) The ranking of 10 students in two subjects A and B are as follows.

A:	3	5	8	4	7	10	2	1	6	9
B:	6	4	9	8	1	2	3	10	5	7

(7Marks)

What is the coefficient of the rank correlation?

b) What is the chance of drawing a total of 3 or 5 or 11 with two dice? (7 Marks)

3. a) Find $\frac{d^2y}{dx^2}$, if $x = a\cos\theta$, $y = b\sin\theta$ (7 Marks)

b) If $y = ae^{x} + be^{-x}$

Prove $\frac{d^2y}{dx^2} - \frac{dy}{dx} = 0$ (7 Marks)

4. Evaluate:-

a) $\int x^2 \log x \, dx$ (5 Marks)

b) $\int \frac{x^2+x}{x(x^2+x+1)} \, dx$ (4 Marks)

c) $\int tan^{-1}x \, dx$ (5 Marks)

5. a) Obtain the equation of a circle which passes through the intersection of lines $3x - 2y - 1 = 0$, $4x + y - 27 = 0$ and whose centre is the point (2, -3). (7 Marks)

b) Find the equation of the hyperbola, the length of whose latus rectum is 8 and eccentricity is $\frac{3}{\sqrt{5}}$. (7 Marks)

6. a) In a quandrantal spherical triangle XYZ, angle X = 73º 1´; side y = 47º 47´, side x = 90º. Calculate angle Y. (7 Marks)

b) In a spherical triangle ABC, angle A = 88º 36 ´, B = 121º 36´, C = 69º 35´. Calculate side a. (7 Marks)

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