

B.Sc. (NAUTICAL SCIENCE)**Term-End Examination****December, 2014****BNA-011 : APPLIED MATHEMATICS***Time : 2 hours**Maximum Marks : 70*

Note : Attempt any five questions. Use of scientific calculator is allowed.

1. (a) Force $\vec{f} = 3\hat{i} + 2\hat{j} - 4\hat{k}$ is applied at the point $(1, -1, 2)$. Find the moment at the force about the point $(2, -1, 3)$. 7

(b) A curve pass through the following points :

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

Find approximately the area bounded by curve with x-axis and ordinates $x = 1$ and $x = 4$, using Simpson's three-eighth rule. 7

2. (a) A problem is given to three students A, B and C, whose chance of solving the problem are $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{4}$. Find the probability that the problem is solved, if they solve independently. 7

(b) Calculate Karl Pearson's coefficient of correlation from the data given below : 7

x : 39 65 62 90 82 75 25 98 36 78

y : 47 53 58 86 62 68 60 91 51 84

3. (a) If $y = \sqrt{\frac{1-x}{1+x}}$,

show that $(1-x^2) \frac{dy}{dx} + y = 0$. 7

(b) Volume of the spherical balloon is increasing at the rate of $25 \text{ cm}^3/\text{sec}$. Find the rate at which the surface area is increasing, when its radius is 5 cm. 7

4. (a) Evaluate $\int \frac{dx}{1 + \sin x + \cos x}$. 7

(b) Using integration, find the area of the region bounded between the line $x = -y$ and the parabola $y^2 = x$. 7

5. (a) In a spherical triangle PZX, angle $P = 85^{\circ}30'$ and sides $x = 49^{\circ}34'$, $z = 99^{\circ}58'$. Calculate the side p . 7
- (b) In a quadrantal spherical triangle ABC side $a = 69^{\circ}09'$, $c = 90^{\circ}$ and angle $C = 117^{\circ}11'$. Calculate the angle A. 7
6. (a) Find the equation of the parabola whose focus is at $(1, -1)$ and the vertex is at $(2, 1)$. 7
- (b) Find out the centre, length of major and minor axis, eccentricity and the focus of the ellipse
- $$x^2 + 4y^2 - 4x + 24y + 31 = 0. \quad 7$$
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