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BNA-011

00364

B.Sc. (NAUTICAL SCIENCE)

Term-End Examination

June, 2011

BNA-011 : APPLIED MATHEMATICS

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt **any five** questions. Use of **calculator** is permitted.*

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1. (a) Find the angle between two vectors $\vec{a}$ and $\vec{b}$ having the same length $\sqrt{2}$ and their scalar products is -1. **7**

(b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's $\frac{1}{3}$ rule taking $h = \frac{1}{4}$ **7**

2. (a) A die is thrown 6 times. If "getting an odd number" is a "success", what is the probability of : **7**

(i) 5 successes

(ii) at least 5 successes

(b) Obtain the line of regression of y on x for the data given below : 7

x :	1.53	1.78	2.60	2.95	3.42
y :	33.50	36.30	40.00	45.80	53.50

3. (a) If $y = 3\cos(\log x) + 4\sin(\log x)$ show that $x^2y_2 + xy_1 + y = 0$. 7

(b) If $y = (\tan^{-1}x)^2$ show that 7

$(x^2+1)^2y_2 + 2x(x^2+1)y_1 = 2$.

4. (a) Evaluate $\int \sqrt{7x - 10 - x^2}\ dx$. 7

(b) Find the area of the region included between the parabolas $y^2 = 4ax$ and $x^2 = 4ay$, where $a > 0$. 7

5. (a) In a spherical triangle ABC, angle $A = 124°21'$, side $AB = 41°30'$ and side $AC = 51°30'$. Calculate side BC using haversine formula. 7

(b) In a spherical right angled triangle angle $B = 90°$, angle $A = 43°30'$ and side $a = 41°45'$. Calculate sides b and c. 7

6. (a) Find the equation of the circle passing through the point (2, 4) and centre at the intersection of the lines $x - y = 4$ and $2x + 3y = -7$. 7

(b) Find the coordinates of the vertices, the foci, the eccentricity and the equations of the directrices of the hyperbola $16y^2 - 4x^2 = 1$. 7