No. of Printed Pages : 2

BNA-011

B.Sc. (NAUTICAL SCIENCE)

00173

Term-End Examination

December, 2012

BNA-011 : APPLIED MATHEMATICS

Time : 2 hours *Maximum Marks : 70*

Note : *(i) Attempt **any five** questions.*

*(ii) Use of calculator is **permitted**.*

---

1. (a) Find λ so that the two vectors $\hat{i} + (2\lambda - 1)\hat{j} + 3\hat{k}$ and $-3\hat{i} + 2\hat{j} - \lambda\hat{k}$ are perpendicular. **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) From a pack of 52 cards, two are drawn one by one without replacement. Find the probability that both of them are kings. **7**

(b) Find the line of regression of y on x for the following data : **7**

x :	10	9	8	7	6	4	3
y :	8	12	7	10	8	9	6

3. (a) If $y = \sqrt{\frac{1 - x}{1 + x}}$ prove that 7

$$\left(1 - x^2\right)\frac{dy}{dx} + y = 0$$

(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 : $\int \frac{x}{\sqrt{x + 2}} dx$ 7

(b) Evaluate $\int \frac{\sin 4x}{\sin x} dx$ 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 concentric with the circle $x^2 + y^2 + 4x + 6y + 11 = 0$ and passing through the point (5, 4). 7

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