

**B.Sc. (NAUTICAL SCIENCE)****Term-End Examination****December, 2013****BNA-011 : APPLIED MATHEMATICS***Time : 2 hours**Maximum Marks : 70**Note : (i) Attempt any five questions.**(ii) Use of scientific calculator is allowed.*

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1. (a) Evaluate  $\int_0^1 \frac{dx}{1+x^2}$  using Simpson's  $\frac{1}{3}$  rule 7  
taking  $h = \frac{1}{y}$
- (b) Find the area of the parallelogram 7  
determined by the vectors  $\hat{i} + 2\hat{j} + 3\hat{k}$  and  
 $3\hat{i} - 2\hat{j} + \hat{k}$ .
2. (a) An insurance company insured 2000 7  
scooter drivers, 4000 car drivers and 6000  
truck drivers. The probability of an accident  
involving a scooter driver, car driver and a  
truck is 0.01, 0.03 and 0.15 respectively. One  
of the insured person meets with an  
accident. What is the probability that he is  
a scooter driver ?

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

$$(x^2 + 1)^2 y_2 + 2x(x^2 + 1) y_1 = 0$$

- (b) If  $x\sqrt{1+y} + y\sqrt{1+x} = 0$  for  $-1 < x < 1$  prove 7

$$\text{that } \frac{dy}{dx} = \frac{-1}{(1+x)^2}$$

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

- (b) Evaluate  $\int \frac{1 - \tan x}{1 + \tan x} dx$  7

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

- (b) In a spherical triangle PQR angles P, Q and R are  $58^\circ 30'$ ,  $100^\circ 24'$  and  $74^\circ 00'$  respectively. Calculate side  $p$ . 7

6. (a) Find the equation of the circle of radius 5 whose centre lies on  $x$ -axis and passes through the point  $(2, 3)$ . 7
- (b) Find the co-ordinate of the vertices, the foci, the eccentricity and the equations of the directrices of the hyperbola  $16y^2 - 4x^2 = 1$ . 7
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