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BNA-011

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B.Sc. (NAUTICAL SCIENCE)

Term-End Examination

June, 2012

BNA-011 : APPLIED MATHEMATICS

Time : 2 hours *Maximum Marks : 70*

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

(ii) Use of calculator is permitted.

1. (a) Find a vector of magnitude 19 and which is perpendicular to both the vector **7**

$$4\hat{i} - \hat{j} + 8\hat{k} \text{ and } -\hat{j} + \hat{k}.$$

(b) Find $\int_1^{11} f(x)\,dx$, where $f(x)$ is given by the following table, using Simpson's one-third rule. **7**

x :	1	2	3	4	5	6	7	8	9	10	11
$f(x)$:	543	512	501	489	453	400	352	310	250	172	95

2. (a) An insurance company insured 2000 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 ? **7**

(b) For 10 observations on price (x) and supply (y), the following data were obtained (in appropriate units) : 7

$\Sigma x = 130$, $\Sigma y = 220$, $\Sigma x^2 = 2288$, $\Sigma y^2 = 5506$ and $\Sigma xy = 3467$ obtain the y on x line of regression.

3. (a) If $x\sqrt{1+y} + y\sqrt{1+x} = 0$ for $-1 < x < 1$ 7

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

(b) If $x = a(\cos t + t \sin t)$ and $y = (\sin t - t \cos t)$, 7

find $\frac{d^2y}{dx^2}$

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

(b) Using integration, find the area of the region bounded between the line $x = 4$ and the parabola $y^2 = 16x$. 7

5. (a) In a spherical triangle PQR angles P, Q and R are 58° 30′, 100° 24′ and 74°00′ respectively. Calculate side p. 7

(b) In a quadrantal spherical triangle ABL, side $b = 90°$ angles A and B are 65°30′ and 75°15′ respectively. Calculate side c and angle C. 7

6. (a) Find the equation of the ellipse given foci $(\pm 3, 0)$ and passing through (4, 1). 7

(b) Find the equation of the circle of radius 5 whose centre lies on x-axis and passes through the point (2, 3). 7