00602

B.Sc. (NAUTICAL SCIENCE)

Term-End Examination

December, 2011

BNA-011 : APPLIED MATHEMATICS

Time : 2 hours   *Maximum Marks : 70*

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

       (ii)   Scientific calculator is allowed.

1. (a) Find the area of the parallelogram   7

   determined by the vectors $\hat{i} + 2\hat{j} + 3\hat{k}$ and

   $3\hat{i} + 2\hat{j} + \hat{k}$.

   (b) Find $\int_{1}^{11} f(x)\,dx$, where $f(x)$ is given by the   7

   following table, using Simpson's one - third rule.

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 7
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 ?

(b) For 10 observations on price (x) and 7
supply (y), the following data were obtained
(in appropriate units) :
$\Sigma x = 130$, $\Sigma y = 220$, $\Sigma x^2 = 2288$, $\Sigma y^2 = 5506$
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 $\dfrac{dy}{dx} = \dfrac{-1}{(1+x)^2}$

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

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

4. (a) Evaluate $\displaystyle\int \dfrac{1 - \tan x}{1 + \tan x}\, dn$ 7

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

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

   (b) Find the equation of the ellipse if $e = \dfrac{3}{4}$, foci on y-axis, centre at origin and passing through (6, 4).   7

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