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BNA-011

B.Sc. (NAUTICAL SCIENCE)

00140

Term-End Examination

June, 2014

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) If $\bar{a}=6\hat{i}-\hat{j}+7\hat{k}$ and $\bar{b}=2\hat{i}-\hat{j}+\lambda\hat{k}$ find the value of λ such that $(\bar{a}+\bar{b})$ and $(\bar{a}-\bar{b})$ are orthogonal vectors. **7**

(b) Find $\int_0^{20} f(x)\,dx$, where $f(x)$ is given by the following table, using Simpson's one-third rule. **7**

x :	0	2	4	6	8	10	12	14	16	18	20
$f(x)$:	0	10	18	25	29	32	20	11	5	2	0

2. (a) The probability that a fire accident due to short circuit is 0.8 and due to the LPG cylinder explosion is 0.2. Chance of fire accident is 30% given a short circuit and 95% given on LPG explosion. Based on these, what do you think is the most probable cause of fire ? Statistically justify your answer. **7**

(b) Find the mean and standard deviation of the following data : 7

x	132 -136	136 -140	140 -144	144 -148	148 -152
f	5	6	27	8	4

3. (a) If $y = x^x + (\sin x)^x$ find $\frac{dy}{dx}$ 7

(b) If $x = a\cos t$, $y = a\sin t$ find $\frac{d^2y}{dx^2}$ at $t = \frac{\pi}{4}$. 7

4. (a) Evaluate $\int \frac{x + 27}{x^2 - 9}\, dx$ 7

(b) Using integration find the area of the region bounded by the curve $x^2 = 4y$ and the line $x = 4y - 2$. 7

5. (a) In a spherical triangle LMN angles L and M are 90° and 44° 16.0' and the side m is 39° 37'. Calculate side n. 7

(b) In a quadrantal spherical triangle PZX $P = 90°$, $x = 64°$ and $Z = 90°$. Calculate X. 7

6. (a) Find the equation of ellipse if the length of latus rectum is $\frac{5}{2}$ and $e = \frac{1}{2}$. 7

(b) Find the equation of the circle passing through the points $(-2, 1)$ and $(1, -2)$ and having the center on the line $x + y + z = 0$. 7