

B.Sc. (NAUTICAL SCIENCE)

Term-End Examination

June, 2010

BNA-011 : APPLIED MATHEMATICS

Time : 2 hours

Maximum Marks : 70

Note : Attempt any five questions. Use of calculator is permitted.

1. (a) If the volume of the parallelepiped whose edges are $-12\hat{i} + \alpha\hat{k}$, $3\hat{j} - \hat{k}$ and $2\hat{i} + \hat{j} - 15\hat{k}$ is 546 determine the value of α . 7
- (b) A solid of revolution is formed by rotating about the x -axis the area between the x -axis, the lines $x = 0$ and $x = 1$ and a curve through the points $(0, 1)$, $(1, 2)$, $(2, 3)$, $(3, 3)$, $(4, 4)$. Estimate the volume of the solid formed using Simpson's $\frac{1}{3}$ rule. 7
2. (a) From the data given below calculate the coefficient correlation between X and Y using Karl Pearson's method. 7
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|----|---|----|----|---|---|
| X: | 6 | 2 | 10 | 4 | 8 |
| Y: | 9 | 11 | ? | 8 | 7 |
- Arithmetic means of X and Y series are 6 and 8 respectively.

- (b) The probability that a management trainee will remain with a company is 0.6. The probability that an employee earns more than Rs. 10,000 per month is 0.5. The probability that an employee is a management trainee who remained with the company or who earns more than Rs. 10,000 per month is 0.7. What is the probability that an employee earns more than Rs. 10,000 per month given that he is a management trainee who stayed with the company. 7
3. (a) Differentiate : 7

$$y = \tan^{-1}(\sqrt{1+x^2} - x) \text{ w.r.t. } x :$$
- (b) Find the equations of the tangent and normal to the parabola $y^2 = 4ax$ at the point $(x_1 > y_1)$. 7
4. (a) Evaluate the integral $\int \sin^3 x \cos^2 x dx$ 7
 (b) Find the area of the region bounded by the parabola $y = x^2 + 2$ and the lines $y = x$, $x = 0$, $x = 3$. 7
5. (a) In a spherical right angled triangle PXZ, angle $Z = 90^\circ$, side $p = 110^\circ 20'$ and side $z = 84^\circ 12'$. Find the values of angle P and side x . 7

- (b) In a spherical triangle WXY, angle W = $88^{\circ}24.5'$, side $x = 98^{\circ}10'$, side $y = 100^{\circ}09'$. Find side w and angle X. 7
6. (a) Find the equation of the parabola with focus (2, 3) and directrix $x - 4y + 3 = 0$. 7
- (b) Find the equation of the circle which passes through the points (1, 0), (0, -6) and (3, 4). 7
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