INDIAN MARITIME UNIVERSITY

(A Central University, Government of India)

End Semester Examination December 2017

Programme Name: B.Sc (Nautical Science) **Semester**: IV

Subject Name: Applied Mathematics-V **Subject Code**: UG21T2402

Date: 04.01.2018 **Maximum Marks**: 70

Time: 3 Hours **Pass Marks**:35

Attempt any FIVE questions out of 7. All questions carry equal marks. Use of approved type Scientific Calculator is allowed.

(5 X 14 = 70 marks)

1. a) Determine the analytic function whose real part is

   $x^3 - 3xy^2 + 3x^2 - 3y^2$.

   b) Evaluate using Cauchy's integral formula:

   $\oint_C \frac{e^z}{(z+1)^2}\, dz$, where C is $|z - 1| = 3$.

2. a) Determine p such that the function $f(z) = \frac{1}{2} log_e(x^2 + y^2) + i\, tan^{-1}\left(\frac{px}{y}\right)$ be an analytic function.

   b) Find the value of $\int_0^{1+i}(x - y + ix^2)\, dz$ along the straight line from $z = 0$ to $z = 1 + i$.

3. a) Find the orthogonal trajectories of the family of curve

   $x^3y - xy^3 = constant$.

   b) Find the residues of $\frac{ze^z}{(z-1)^3}$ at its poles.

4. a) Evaluate using Cauchy's integral formula $\oint_C \frac{\cos \pi z}{z^2-1}\, dz$, around a rectangle with vertices $2 \pm i, -2 \pm i$.

   b) The scores obtained by two batsmen A and B in 10 matches are given below:

A	30	44	66	62	60	34	80	46	20	38
B	34	46	70	38	55	48	60	34	45	30

Calculating mean, Standard Deviation and coefficient of variation for each batsman, determine who is more efficient and who is more consistent.

5. a) The first four moments of a distribution about the value '4' of the variable are -1.5, 17, -30 and 108. State whether the distribution is lepokurtic or platykurtic.

   b) In a partially destroyed laboratory data ,only the equations giving the two lines of regression of y on x and x on y are available and are respectively, $\mathbf{4x - 5y + 33 = 0}$, $\mathbf{20x - 9y = 107}$. Calculate the coefficient of correlation, $\bar{x}$, $\bar{y}$.

6. a) Find the coefficient of correlation between industrial production and export using the following data and comment on the result.

Production(in crore tons)	55	56	58	59	60	60	62
Exports (in crore tons)	35	38	38	39	44	43	45

   b) A variate $\boldsymbol{X}$ has the probability distribution

x	-3	6	9
$P(X = x)$	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{1}{3}$

   Find $E(X)$and $E(X^2)$. Hence evaluate $E(2X + 1)^2$.

7. a) If in a lot of 500 solenoids 25 are defective, find the probability of 0,1,2,3 defective solenoids in a random sample of 20 solenoids.

   b) If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2000 individuals more than two will get a bad reaction.

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