INDIAN MARITIME UNIVERSITY

(A Central University, Government of India)

END SEMESTER EXAMINATION-DECEMBER 2019

B.Sc(Nautical Science)

Semester – IV

Applied Mathematics-V

(UG21T2402)

Date: 14.12.2019 Max Marks: 70

Time: 3 Hrs Pass Marks : 35

Note: Answer any **7** Questions.

All questions carry equal marks.

1. a) Find the orthogonal trajectories of the family of curves
$$x^4 + y^4 - 6x^2y^2 = constant$$
b) Evaluate $\int_0^{2+i} (\bar{z})^2\, dz$, along the real axis to 2 and then vertically to 2+i.

(5+5 marks)

2. a) If $f(z)$ is analytic function with constant modulus, show that $f(z)$ is constant.
b)Evaluate : $\int_C \frac{z^2-z+1}{z-1} dz$, where C is the circle
$$(i)|z| = 1 \qquad (ii)|z| = \frac{1}{2}$$

(5+5 marks)

3. a) Evaluate , using Cauchy's integral formula :

$\oint_C \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)}\, dz$ Where C is the circle /z/=3.

b) Evaluate $\oint_C \frac{e^{2z}}{(z+1)^4} dz$, where C is the circle /z/=3, using Cauchy's integral formula

(5+5 marks)

4. a) Find the sum of the residues of $f(z) = \frac{\sin z}{(z \cos z)}$ at its poles inside the circle /z/=2.

b) Find the Laurent's series expansion of $f(z) = \frac{7z-2}{(z+1)z(z-2)}$ in the region $1 < z + 1 < 3$

(5+5 marks)

5. a) Calculate the median, quartiles and the quartile coefficient of skewness from the following data:

Weight (lbs)	70-80	80-90	90-100	100-110	110-120	120-130	30-140	140-150
No.of persons	12	18	35	42	50	45	20	8

b) Ten participants in a contest are ranked by two judges as follows. Calculate the rank correlation coefficient ρ

x	1	6	5	10	3	2	4	9	7	8
y	6	4	9	8	1	2	3	10	5	7

(5+5 marks)

6. a) A bag contains 8 white balls and 6 red balls. Find the probability of drawing two balls of the same colour.

b) A pair of dice is tossed twice. Find the probability of scoring 7 points (i) once , (ii) at least once (iii) twice.

(5+5 marks)

7. a) A variate X has the probability distribution

x	-3	6	9
P(X=x)	1/6	1/2	1/3

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

b) If X is a continuous random variable with probability density function given by $f(x) = \begin{cases} kx\ (0 \le x < 2) \\ 2k\ (2 \le x < 4) \\ -kx + 6k (4 \le x < 6) \end{cases}$

Find k and mean value of X.

(5+5 marks)

8. a) In a binomial distribution consisting of 5 independent trials, probabilities of 1 and 2 are 0.4096 and 0.2048 respectively. Find the parameter 'p' of the distribution.

b) The probability that a pen manufactured by a company wil be defective is 1/10. If 12 such pens are manufactured , find the probability that (i) at least two will be defective. (ii) none will be defective.

(5+5 marks)

9. a) If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2,000 individuals more than two will get a bad reaction.

b) Fit a Poisson distribution to the set of observations:

x	0	1	2	3	4
f	122	60	15	2	1

(5+5 marks)

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