Indian Maritime University

(A Central University, Govt of India)

B.SC (Nautical Science)

May/June 2018 End Semester Examinations

Semester IV

Applied Mathematics-V- UG21T2402

Time: 3 Hours | Max Marks: 70

Date: 06.06.2018 | Pass Marks: 35

Note: Answer any **Seven** questions out of Nine Questions.
All questions carry equal marks.

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1 Find the analytic function Z=u+iv if u-v=(x-y) (X^2+4xy+Y^2) (10 Marks)

2 a) Evaluate using Cauchy 's integral formula:

$\oint_C \frac{e^{tz}}{z^2+1}\,dz$ where C is the circle $|z| = 3$. (5 Marks)

b) Determine poles of the function $\frac{2z+4}{(z+1)(z^2+1)}$ also find residue at each point. (5 Marks)

3 a) Evaluate $\oint_C \frac{e^{2z}}{(z+2)(z+4)(z+7)}\,dz$ for C as circle $|z| = 3$. (5 Marks)

b) Evaluate $\oint_C \frac{e^{2z}}{(z+1)^4}\,dz$ where C is the circle $|z| = 3$. (5 Marks)

4 a) Prove that $u = x^2 - y^2$ and $v = \frac{y}{x^2+y^2}$ are harmonic functions of (x, y) but are not harmonic conjugates. (5 Marks)

b) 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. (5 Marks)

5 a) Evaluate $\oint_C \frac{sin^2 z}{\left(z-\frac{\pi}{6}\right)^3}\,dz$,where C is the circle $|z| = 1$. (5 Marks)

b) Find the mean and standard deviation of the two samples put together: (5 Marks)

Sample No.	Size	Mean	Standard deviation
1	50	158	5.1
2	60	164	4.6

6 a) The first four moments of a distribution about the value 0 are -0.20,1.76, -2.36 and 10.88 . Find the moments about the mean and the kurtosis. (5 Marks)

b) Calculate the Rank correlation coefficient from the following data showing ranks of 10 students in two subjects:

Maths	3	8	9	2	7	10	4	6	1	5
Physics	5	9	10	1	8	7	3	4	2	6

(5 Marks)

7 a) Two random variables have the regression lines with equations $3x + 2y = 26$ and $6x + y = 31$. Find the mean values and the correlation between x and y. (5 Marks)

b) The probability density function of a variate X is:

X	0	1	2	3	4	5	6
$P(X)$	k	$3k$	$5k$	$7k$	$9k$	$11k$	$13k$

i) Find $P(X < 4)$, $P(X \geq 5)$, $P(3 < X \leq 6)$.

ii) What will be the minimum value of k so that $P(X \leq 2) > 3$.

(5 Marks)

8 a) Find the standard deviation for the following discrete distribution:

x	8	12	16	20	24
$P(x)$	$\frac{1}{8}$	$\frac{1}{6}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{1}{12}$

(5 Marks)

b) The probability that an entering student will graduate is 0.4 . Determine the probability that out of 5 students, (a) none (b) one and (c) at least one will graduate. (5 Marks)

9 a) A manufacturer knows that the condensers he make contain on the average 1% defectives. He packs them in boxes of 100. What is the probability that a box picked at random will contain 3 or more faulty condensers. (5 Marks)

b) Fit a Poisson distribution to the set of observations: (5 Marks)

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