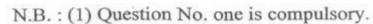
SE/IN/comp/App. 179#41-IN/23/11/15

(3 Hours)



Q.P. Code: 5316

[Total Marks: 80



- (2) Answer any three questions from Q.2 to Q.6
- (3) Use of stastical Tables permitted.
- (4) Figures to the right indicate full marks

1. (a) Evaluate the line integral
$$\int_0^{1+i} (x^2 - iy) dz$$
 along the path $y = x^2$

(b) State Cayley-Hamilton theorem & verify the same for
$$A = \begin{bmatrix} 1 & 3 \\ 2 & 2 \end{bmatrix}$$
 5

(c) The probability density function of a random variable x is

x	-2	-1	0	1	2	3			
P(x)	0.1	k	0.2	2k	0.3	K	1		
- Fi	nd i) k	ii) r	nean	iii) v	variano	ce.		1	

(d) Find all the basic solutions to the following problem

Maximize
$$z = x_1 + 3x_2 + 3x_3$$

Subject to $x_1 + 2x_2 + 3x_3 = 4$

$$2x_1 + 3x_2 + 5x_3 = 7$$

and $x_1, x_2, x_3 \ge 0$

and
$$x_1, x_2, x_3 \ge 0$$

2. (a) Find the Eigen values and the Eigen vectors of the matrix $\begin{bmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -5 & -2 \end{bmatrix}$ 6

(b) Evaluate
$$\oint_C \frac{dz}{z^3(z+4)}$$
 where c is the circle $|z| = 2$

(c) If the heights of 500 students is normally distributed with mean 68 inches and standard deviation of 4 inches, estimate the number of students having heights

i) less than 62 inches, ii) between 65 and 71 inches.

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3. (a) Calculate the coefficient of correlation from the following data

x	30	33	25	10	33	75	40	85	90	95	65	55
y	68	65	80	85	70	30	55	18	15	10	35	45

- (b) In sampling a large number of parts manufactured by a machine, the mean number of defectives in a sample of 20 is 2. Out of 100 such samples now many would you expect to contain 3 defectives i) using the Binomial distribution,
- (c) Show that the matrix $\begin{bmatrix} -9 & 4 & 4 \\ -8 & 3 & 4 \\ -16 & 8 & 7 \end{bmatrix}$ is diagonalizable. Find the transforming
- 4. (a) Fit a Poisson distribution to the following date

matrix and the diagonal matrix.

ii) Poisson distribution.

x	0	1	2	3	4	(5)	6	7	8
f	56	156	132	92	37	22	4	0	1

(b) Solve the following LPP using Simplex method

Maximize
$$z = 6x_1 - 2x_2 + 3x_3$$

Subject to $2x_1 - x_2 + 2x_3 \le 2$
 $x_1 + 4x_3 \le 4$
 $x_1, x_2, x_3 \ge 0$
(c) Expand $f(z) = \frac{2}{(z-2)(z-1)}$ in the regions

i)
$$|z| < 1$$
, ii) $1 < |z| < 2$, iii) $|z| > 2$

5. (a) Evaluate using Cauchy's Residue theorem $\oint_C \frac{1-2z}{z(z-1)(z-2)} dz$ where c is

$$|z| = 1.5$$

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MD-Con. 8175-15.

- (b) The average of marks scored by 32 boys is 72 with standard deviation 8 while that of 36 girls is 70 with standard deviation 6. Test at 1% level of significance whether the boys perform better than the girls.
- (c) Solve the following LPP using the Dual Simplex method

Minimize
$$z = 2x_1 + 2x_2 + 4x_3$$

Subject to $2x_1 + 3x_2 + 5x_3 \ge 2$
 $3x_1 + x_2 + 7x_3 \le 3$
 $x_1 + 4x_2 + 6x_3 \le 5$
 $x_1, x_2, x_3 \ge 0$.

6. (a) Solve the following NLPP using Kuhn-Tucker conditions

Maximize
$$z = 10x_1 + 4x_2 - 2x_1^2 - x_2^2$$

Subject to $2x_1 + x_2 \le 5$; and $x_1, x_2 \ge 0$

(b) In an experiment on immunization of cattle from Tuberculosis the following results were obtained

	Affected	Not Affected	Total
Inoculated	267	2.7	294
Not Inoculated	757	155	912
Total	1024	182	1206

Use χ^2 Test to determine the efficacy of vaccine in preventing tuberculosis.

- (c) i) The regression lines of a sample are x + 6y = 6 and 3x + 2y = 10find a) sample means \bar{x} and \bar{y} b) coefficient of correlation between x and y = 4
 - ii) If two independent random samples of sizes 15 & 8 have respectively the means and population standard deviations as

$$\bar{x}_1 = 980, \bar{x}_2 = 1012: \sigma_1 = 75, \sigma_2 = 80$$

Test the hypothesis that $\mu_1 = \mu_2$ at 5% level of significance.