SE/Sem-IV/CBGS/ Comp & IT/ Nov - Dec' 16/ 24/11/16

Sub.: AM-IV

QP Code : 541304

(3 Hours) [Total Marks : 80

N.B. : (1) Question No. **one** is **compulsory.**
(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
(5) Assume suitable data wherever applicable.

1. (a) Find the Eigenvalues and eigenvectors of the matrix. **5**

$$A = \begin{bmatrix} 2 & 1 & 0 \\ 0 & 2 & 1 \\ 0 & 0 & 2 \end{bmatrix}$$

(b) Evaluate the line integral $\int_0^{1+i} (x^2 + iy)dz$ along the path $y = x$ **5**

(c) Find k and then E (x) for the p.d.f. **5**

$$f(x) = \begin{cases} k(x-x^2) & ,0 \le x \le 1, k > 0 \\ 0 & ,\text{otherwise} \end{cases}$$

(d) Calculate Karl pearson's coefficient of correlation from the following data. **5**

x	100	200	300	400	500
y	30	40	50	60	70

2. (a) Show that the matrix $A = \begin{bmatrix} 2 & -2 & 3 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$ is non- derogatory **6**

(b) Evaluate $\int \frac{e^{2z}}{(z+1)^4} dz$ where C is the circle $|z-1| = 3$ **6**

(c) If x is a normal variate with mean 10 and standard deviation 4 find **8**
(i) $P(|x-14|<1)$ (ii) $P(5 \le x \le 18)$ (iii) $P(x \le 12)$

3. (a) Find the relative maximum or minimum (if any) of the function 6
$Z = x_1^2 + x_2^2 + x_3^2 - 4x_1 - 8x_2 - 12x_3 - 100$

(b) If x is Binomial distributed with E (x) =2 and V (x) = 4/3. find the probability distribution of x. 6

(c) If $A = \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$. find A^{50}. 8

6

4. (a) Solve the following L.P.P. by simplex method
Minimize $z = 3x_1 - 2x_2$
Subject to $3x_1 + 2x_2 \leq 18$
$0 \leq x_1 \leq 4$
$0 \leq x_2 \leq 6$
$x_1, x_2 \geq 0.$

(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. 6

(c) Find Laurent's series which represents the function $f(z) = \frac{2}{(z-1)(z-2)}$ 8
When (i) $|z| < 1$. (ii) $1<|z|<2$ (iii) $|z|>2$

5. (a) Evaluate $\int_C \frac{z^2}{(z-1)^2(z+1)}\,dz$ where C is $|z| = 2$ using residue theorem 6

(b) The regression lines of a sample are x+6y=6 and 3x+2y=10 Find 6
(i) Sample means $\bar{x}$ and $\bar{y}$
(ii) Correlation coefficient between x and y. Also estimate y When x = 12

(c) A die was thrown 132 times and the following frequencies were observed 8

No.obtained	1	2	3	4	5	6	Total
Frequency	15	20	25	15	29	28	132

Using χ^2 -test examine the hypothesis that the die is unbiased.

6. (a) Evaluate $\int_{-\infty}^{\infty} \frac{x^2+x+2}{x^4+10x^2+9}\,dx$ using contour integration. **6**

(b) If a random variable x follows Poisson distribution such that P (x =1) =2 P (x =2) Find the mean and the variance of the distribution. Also find P (x=3). **6**

(c) Use Penalty method to solve the following L.P.P. **8**

Minimize $z = 2x_1 + 3x_2$

Subject to $x_1 + x_2 \geq 5$

$x_1 + 2x_2 \geq 6$

$x_1, x_2 \geq 0.$
