

[Time: 3 Hours]

[Marks:80]

Please check whether you have got the right question paper.

N.B: 1. Q.1 is compulsory

2. Attempt any three out of remaining five question

3. Rights indicate full marks.

1. a. Find greatest common divisor of the following pairs of integer, using Euclidean algorithm. (3083, 2893) 05
- b. Given two lines regression 05
 $6y = 5x + 90, 15x = 8y + 130, \sigma_x^2 = 16$
 Find (i) $\bar{x}$ and $\bar{y}$ (ii) Find r
- c. Prove that $A = \{1, 2, 3, 4, 5, 6\}$ is a finite abelian group under multiplication modulo 7 05
- d. A random variable x has the following probability function 05

x:	1	2	3	4	5	6	7
p(x)	K	2K	3K	K^2	$K^2 + k$	$2K^2$	$4K^2$
Find	(I) k	(II) p (x < 5)					
2. a. Calculate coefficient of correlation between x and y 06

x:	3	6	4	5	7
y:	2	4	5	3	6
- b. A random sample of size 16 from a normal population. Showed a mean of 103.75 cm and sum of squares of deviation from the mean 843.75 cm^2 can we say that the population has mean of 108.75 cm? 06
- c. Prove that $G = \{1, -1, i, -i\}$ is a group under usual multiplication of complex numbers. 08
3. a. Draw Hasse diagram for $(D_{75}, \leq)$, check whether it is a lattice 06
- b. Out of 1000 families of 3 children each how many would you expect to have 2 boys and 1 girl? 06
- c. i. Find last digit of base 7 expansion of 3^{100} i.e. $3^{100} \pmod{7}$ by using Fermat's theorem 08
 ii. Find the Legendre's symbol $\left(\frac{19}{23}\right)$
4. a. Can a complete graph with 8 vertices have 40 edges excluding self-loop 06
- b. Find remainder when 2^{50} and 41^{65} are divisible by 7 06

- c. Investigate the association between darkness of eye colour in father and son from the following data 06

Son's eye	father's eye			Total
		Dark	Not Dark	
	Dark	48	90	
	Not dark	80	782	
		128	872	1000

5. a. Let $L = \{1, 2, 3, 4, 12\}$ and the relation be "is divisible by" write compliments of L 06

- b. If x is a Poisson variate and $p(x=0) = 6 p(x=3)$ Find $P(x=2)$ 06

- c. Define the following terms giving illustration 08

1.	Simple graph	2.	Complete graph
3.	Bipartite graph	4.	Planar graph

6. a. Solve $x \equiv 1 \pmod{5}$ 06

$$x \equiv 2 \pmod{6}$$

$$x \equiv 3 \pmod{7}$$

- b. A certain injection administered to 12 patients resulted in following changes of blood pressure (5, 2, 8, -1, 3, 0, 6, -2, 1, 5, 0, 4) can it be concluded that injection will be in general accompanied by an increase in blood pressure? 06

- c. i. Write the following permutation as product of disjoint cycles 08

$$f = (1\ 3\ 2\ 5)(1\ 4\ 5)(2\ 5\ 1)$$

- ii. simplifies sum of product

$$(A+B)(A+B^1)(A^1+B)(A^1+B^1)$$
