

[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. **05**
 (3083, 2893)
- 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**

		father's eye		
Son's eye		Dark	Not Dark	Total
	Dark	48	90	138
	Not dark	80	782	862
		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

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