2020
MATHEMATICS – HONOURS
SEMESTER-5
TUTORIAL
Full Marks In each Course: 15

The figures in the margin indicate full marks .
Symbols and notations used here carry their usual meaning.
Candidates are required to give their answers in their own words as far as practical.

Course: CC11 (Probability & Statistics) ***5×3***

1. Suppose that the number of defective screws produced by a machine per day has a Poison distribution with parameter 2. What are the probabilities that out of the total production of the day, there are (i) no defective screw, (ii) exactly 2 defective screws, (iii) at least two defective screws, (iv) at most 2 defective screws, (v) less than 3 defective screws.

2. Find the equation of regression lines in a bivariate population and find a measure of goodness of fit.

3. State and prove a necessary condition of an unbiased estimate is to also be a consistent estimate of a population parameter. Support by an example too.

Course: CC12(Group Theory II & Linear Algebra II) ***5×3***

4. Let G_1 and G_2 be two finite cyclic groups of order m and n respectively. Then prove that $G_1 \times G_2$ is cyclic if and only if $gcd(m,n) = 1$.
5. Let G be a p-primary finite abelian group. Show that every non-identity element of G is of order p if and only if G $\simeq$ Zp $\bigoplus$ Zp $\bigoplus \cdots \bigoplus$ Zp.
6. Let $T: R^3 \to R^3$ be defined by $T(x,y,z) = (x+2y, 3x-4z, y)$. Find $T^*(x,y,z)$.

Course: DSE-A1(Advanced Algebra) ***5×3***

7. Give an example of a simple group with proper justification.

8. Show that $\mathbb{Z}[i]$ is a Euclidean Domain.

9. State and Prove Sylow's Second theorem.

Course: DSE-B2 (LPP & Game Theory) ***5×3***

10. Prove that ***X*** = $\{x: |x| \leq 2\}$ is a convex set.
11. Solve Graphically
    Minimize $Z = 3x + 5y$
    Subject to: $2x + 3y \geq 12$
    $-x + y \leq 3$
    $x \leq 4$
    $y \geq 3$

12. Find the Initial Solution of the given Transportation Problem by North West Corner Method.

	D_1	D_2	D_3	a_i
O_1	5	1	8	12
O_2	2	4	0	14
O_3	3	6	7	4
b_j	9	10	11	