Kandi Raj College – Department of Mathematics – Internal QP – 2021 – 5th Semester – HONOURS STREAM

Full marks: 10 + 10 + 10 + 10;

ANSWER EACH PART IN SEPARATE ANSWER SCRIPTS

	CC-T-11	**10**
1.	Form a partial differential equation by eliminating the arbitrary function f from $f(x+y+z, x^2+y^2-z^2) = 0$.	05
2.	Give one example of each of the following exclusive types of 1st order partial differential equation in two independent variables: (i) Linear; (ii) Semi-linear; (iii) Quasilinear; (iv) Nonlinear.	05

	CC-T-12	**10**
1.	Answer any TWO questions	2 × 5
(a)	Find $Aut(\mathbb{Z})$.	
(b)	Prove that every subgroup of a cyclic group is a characteristic subgroup.	
(c)	Determine the number of elements of order 25, in $\mathbb{Z}_{25} \oplus \mathbb{Z}_5$.	

	DSE – T – 1A	**10**
1.	Solve the following L.P.P by graphical method: Maximize $Z = 3x_1 + x_2$; Subject to the constraints: $2x_1 + x_2 \leq 2,$ $6x_1 + 2x_2 \leq 9,$ $x_1,\ x_2 \geq 0.$	05
2.	A factory is engaged in manufacturing three products A, B and C which involve lathe work, grinding and assembling. The cutting, grinding and assembling times required for one unit of A are 1, 2 and 3 hours respectively. Similarly, they are 2, 3, 2 hours for unit of B and 3, 2, 1 hours for one unit of C. The profits on A, B and C are Rs. 2, Rs. 3 and Rs. 4 per unit respectively. Assuming that there are available 280 hours of the lathe time, 290 hours of grinding time and 275 hours of assembly time, how many units of each product should be produced to maximize profit? Formulate the problem mathematically.	05

	DSE – T – 2A	**10**
1.	Answer any TWO questions	2 × 5
(a)	Find the mean and variance of the following p.d.f: $f(x) = \frac{6}{5}x(1-x), 1 < x < 2$	
(b)	A random variable X can take up values $-1, 0, 1$ with probabilities $\frac{1}{2}, \frac{1}{3}$ and $\frac{1}{6}$ respectively. Write down the distribution function.	
(c)	For binomial distribution establish the recurrence formula $\mu_{r+1} = pq\left[nr\mu_{r-1} + \frac{d\mu_r}{dp}\right]$, where the symbols have usual meaning.	

END