

Reg No.: \_\_\_\_\_

Name : \_\_\_\_\_



**Jyothi Engineering College(Autonomous)**  
**M.Tech Degree S1 (R) Examination, December 2025 (2025 Scheme)**  
**25PCST102- FOUNDATIONS OF COMPUTER SCIENCE**



Total Mark: 60

Total Time: 2hr 30min

CO MARK

**PART A**

Answer All Questions

1. Prove that if  $n$  is an odd integer then  $n^2$  is odd. CO1 (5)
2. How many positive integers are there less than 1000 and divisible by 7 or 11? CO2 (5)
3. Find the generating function of the sequence(1, 1, 1, 1, 1, 1). CO3 (5)
4. A random variable  $X$  follows a Poisson distribution with mean  $=1$ . Calculate the probability that (a)  $X=0$  and (b)  $X \geq 2$ . CO4 (5)
5. Find the probability that among  $n$  people there are at least two people have the same birthday in a year. CO5 (5)

**PART B**

Answer Any Five Question(s)

6. Use mathematical induction to show that  $1 + 2 + 2^2 + \dots + 2^n = 2^{n+1} - 1$  CO1 (7)
7. How many solutions does  $X_1 + X_2 + X_3 = 11$  have, where  $X_1, X_2$  and  $X_3$  are non-negative integers with  $X_1 \leq 3, X_2 \leq 4$  and  $X_3 \leq 6$ ? CO2 (7)
8. Show that the set of real numbers are not countable. CO2 (7)
9. Solve the recurrence relation  $a_n - 3a_{n-1} = 5.7^n : n \geq 1, a_0 = 2$ . CO3 (7)
10. If  $X$  is a normal random variable with parameters  $\mu=3$  and  $\sigma=3$ . Find (1)  $P(2 < X < 5)$  (2)  $P(X > 0)$  and (3)  $P(|X-3| > 6)$ . CO4 (7)
11. Let  $E_1$  contains 4 white ball and 5 black balls,  $E_2$  contains 10 white and 2 black balls and  $E_3$  contains 6 white and 6 black balls.  $A$  is the event that a white ball has been drawn. What is the probability that the white ball is from  $E_2$ ? CO4 (7)
12. State and Prove Lagrange's theorem. CO5 (7)

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