



VIT

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SLOT: G1 + TG1

REG.NO.:

**SCHOOL OF ADVANCED SCIENCES
CONTINUOUS ASSESSMENT TEST - I
FALL SEMESTER 2026-2027**

Programme Name & Branch	: B. Tech	
Course Code	: BAMAT207	
Course Name	: Probability and Statistics	
Faculty Name(s)	: M. Yamuna, Mubashir Unnisha, Kalpanapriya. D	
Class Number(s)	: 3399, 3405, 3401	
Date of Examination	: 16/08/26	
Exam Duration	: 90 minutes	Maximum Marks: 50

General instruction(s):

- Answer All Questions
- Use of Statistical Tables is Permitted
- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyze, 5 - Evaluate, 6 - Create)
- Course Outcomes Statements:

CO. 1: Apply probability and statistical methods to solve engineering problems, including system
CO. 2: Implement probability distributions to model random variables and analyze statistical properties.

properties.

Q. No	Question	M	CO	BL																				
1.	A producer of a certain type of electronic component ships to suppliers in lots of twenty. Suppose that 60% of all such lots contain no defective components, 30% contain one defective component, and 10% contain two defective components. A lot is picked, two components from the lot are randomly selected and tested, and neither is defective. (a) What is the probability that zero defective components exist in the lot? (b) What is the probability that one defective exists in the lot? (c) What is the probability that two defectives exist in the lot?	10	1	2																				
2.	A discrete random variable X has the following probability distribution <table><tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr><tr><td>f(x)</td><td>a</td><td>3a</td><td>5a</td><td>7a</td><td>9a</td><td>11a</td><td>13a</td><td>15a</td><td>17a</td></tr></table> (a). Find the value of a. (b). Find $P(0.5 < X < 5.75 X > 2.5)$. (c). Find the cumulative distribution of X. (d). Find the least value of λ such that $P(X \leq \lambda) > \frac{1}{2}$.	x	0	1	2	3	4	5	6	7	8	f(x)	a	3a	5a	7a	9a	11a	13a	15a	17a	10	1	2
x	0	1	2	3	4	5	6	7	8															
f(x)	a	3a	5a	7a	9a	11a	13a	15a	17a															
3.	A fast-food restaurant operates both a drive through facility and a walk-in facility. On a randomly selected day, let X and Y, respectively, be the proportions of the time that the drive-	10	1	2																				



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	through and walk-in facilities are in use, and suppose that the joint density function of these random variables is $f(x, y) = \begin{cases} \frac{2}{3}(x+2y) & 0 \leq x \leq 1, 0 \leq y \leq 1 \\ 0 & \text{elsewhere} \end{cases}$ (a) Find the marginal density of X. (b) Find the marginal density of Y. (c) Find the covariance.			
4.	According to <i>Chemical Engineering Progress</i> , approximately 30% of all pipework failures in chemical plants are caused by operator error. (a) What is the probability that out of the next 20 pipework failures at least 10 are due to operator error? (b) What is the probability that no more than 4 out of 20 such failures are due to operator error? (c) Suppose, for a particular plant, that out of the random sample of 20 such failures, exactly 5 are due to operator error. Do you feel that the 30% figure stated above applies to this plant? Comment.	10	2	3
5.	a) The average number of field mice per acre in a 5-acre wheat field is estimated to be 12. Find the probability that fewer than 7 field mice are found (i) on a given acre; (ii) on 2 of the next 3 acres inspected.	5	2	3
	b) The probability that a student pilot passes the written test for a private pilot's license is 0.7. Find the probability that a given student will pass the test (i) on the third try; (ii) before the fourth try.	5	2	3
