VIT

Vellore Institute of Technology

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

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

SLOT: F1+TF1

Programme Name & Branch	: B.Tech Common to all
Course Code and Course Name	: BAMAT207 – Probability and Statistics
Faculty Name(s)	: Common to F1+TF1 slot
Class Number(s)	: Common to F1+TF1 slot
Date of Examination	: 14.08.2026 FN
Exam Duration	: 90 minutes

Maximum Marks: 50

General instruction(s): Statistical table permitted

- Answer All Questions
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- Course Outcomes

CO1 : Apply probability concepts, including axioms, conditional probability, and Bayes' theorem, to solve real-world problems.

CO2 : Implement probability distributions to model random variables and analyse statistical properties.

Q. No	Question	M	CO	BL
1	A doctor is to visit a patient. From the past experience, it is known that the probabilities that he will come by train, bus, scooter or by other means of transport are respectively $\frac{3}{10}, \frac{1}{5}, \frac{1}{10}$ and $\frac{2}{5}$. The probabilities that he will be late are $\frac{1}{4}, \frac{1}{3}$ and $\frac{1}{12}$, if he comes by train, bus and scooter respectively, but if he comes by other means of transport, then he will not be late. Find the following. (a) Probability that he is late on a given day. (b) Suppose on a given day he is late. What is the probability that he comes by either train or bus?	10	1	2
2.	A random variable X has the following probability mass function $\begin{array}{|c|c|c|c|c|c|c|c|}\hline X & 1 & 2 & -3 & 4.3 & -5 & \pi & \frac{21}{4} \\ \hline P(X) & m & 2m & 2m & 3m & m^2 & 2m^2 & 7m^2+m \\ \hline\end{array}$ and $P(X) = 0, X \in \mathbb{R} - \{1,2,-3,4.3,-5,\pi,\frac{21}{4}\}$ (i) Find the value of m. (ii) Find $P(X \leq 3.14)$. (iii) Find cumulative probability distribution of X. (iv) Find $P(X\ is\ even)$.	10	2	2

REG.NO.:

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3.	The joint probability density function of the two dimensional continuous random variable (X, Y) is defined as $f_{X,Y}(x,y) = \begin{cases} 25e^{-5(x+y)} & , \text{ if } x, y \geq 0 \\ 0 & , \text{otherwise} \end{cases}$. Then (a) Are X and Y independent. (b) Is $E(X/Y=5) = E(X)$? Justify your answer. (c) Find $E((X-\bar{X})(Y-\bar{Y}))$.	10	2	2
4.	A large consignment of electrical bulbs contains 25% defective bulbs. A random sample of 10 bulbs is selected for inspection. Find the probability that (i) Exactly there are 3 defective bulbs. (ii) Almost there are 3 defective bulbs. (iii) All are good bulbs. Also find the expected number of good bulbs in a sample of 120 bulbs.	10	2	3
5.	(a) On average, a machine produces 2 items per hour. The number of items produced by the machine follows a Poisson distribution. What is the probability that the machine produces at least 3 items in 3 hours? (b) A dance class has 11 students, five of whom are named as Gabriel. The dance master has forgotten the students' names and randomly calls out the name of a student until he identifies a student whose name is not Gabriel. Assuming each call is independent and equally likely to be any student's name. What is the probability that the instructor identifies a non-Gabriel student on the 4th call?	6+4 =10	2	3

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