



VIT[®]

Vellore Institute of Technology

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

DEPARTMENT OF MATHEMATICS

SCHOOL OF ADVANCED SCIENCES

Course: MAT 1017- Probability and Statistics

CONTINUOUS ASSESSMENT TEST 1 – FALL 2023-2024.

SLOT: E2+ TE2 TIME: 90 MINUTES sep .2023 Marks :50

ANSWER ALL THE QUESTIONS

1. Easy

10 marks

CO1

BL3

(a) A club in SAS school of VIT, consists of 18 girls and 10 boys. In how many ways a team of 5 girls and 3 boys can be formed? [4 MARKS]

(b) A student Ms. L, can either take a course in Computers or in Statistics. If Ms. L, takes the computer course, then she will receive an A grade with probability $1/2$; if she takes the Statistics course then she will receive an A with probability $1/3$. Mr. L decides to base her decision on the flip of a fair coin. What is the probability that Mr. L will get an A in Statistics? [6 MARKS]

2. Tough

10 marks

CO1

BL1

An aero-plane emergency locator transmitter (AELT) is a device designed to transmit a signal in the case of an urgent time. The 'A' Manufacturing Company makes 80% of the ELTs, the 'B' Company makes 15% of them, and the 'C' Company makes the other 5%. The AELTs made by the company 'A' have a 4% rate of defects, the B company AELTs have a 6% rate of defects, and the C company AELTs have a 9% rate of defects (which helps to explain why company C has the lowest market share). If an AELT is randomly selected from the general population of all AELTs, find the probability that it was made by (a) the company 'A', (b) the company 'B'

3. Easy

10 marks

CO1

BL3

Find the mean and the variance of a discrete random variable X, where X is the output when we throw 2 dice at a time.

4. Moderate

10 marks

CO1

BL3

If X follows a continuous random variable with p.d.f given by $f(x) = \begin{cases} kx & (0 \leq x < 2) \\ 2k & (2 \leq x < 4) \\ 6k - kx & (4 \leq x < 6) \end{cases}$

then, find (i) the value of 'k', (ii) $P(0 < x < 5)$ and (iii) the cumulative distribution function F(x).

5. Tough

10 marks

CO1

BL1

Find the moment generating function of the exponential distribution with parameter, $\lambda = 2$. [i.e., the p.d.f of the exponential distribution is given by $f(x) = 2e^{-2x}$, for $x > 0$ and $\lambda > 0$] And hence, find the first and second raw moments. Also obtain the mean and variance of the given distribution.