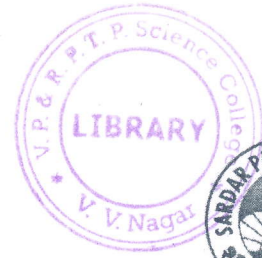


A Charutar Vidya Mandal's Institution
V.P. & R.P.T.P. SCIENCE COLLEGE
(AUTONOMOUS) (Grant-in-Aid)
Affiliated to Sardar Patel University
VALLABH VIDYANAGAR-388120



Bachelor of Science (Semester VI) Internal Examination - 2026
US06MISTA01: Probability Distributions

Time: 10:45 AM to 11:45 PM

Date: 09-03-2026 (Monday)

Total marks :20

Note: (i) Q.2 and 3, each question is of 7 marks (ii) Graph paper will be provided on request

Q.1 Write the most appropriate answer from the following multiple-choice questions. [06]

- (1) The m.g.f. of a r.v. X is $M_X(t) = \frac{1}{1-5t}$, $t < 1/5$, what will the value of ' k ' so that $P(X > k) = 1/4$?
(a) 0.72 (b) 0.28 (c) 6.93 (d) 1.39
- (2) Bernoulli distribution is a particular case of
(a) Binomial (b) Poisson (c) Hypergeometric (d) None of these
- (3) If $X \sim \beta_1(m, n)$ then $V(X) =$ _____
(a) $mn/(m+n)^2$ (b) $m/((m+n))$ (c) $mn/(m+n)(m+n+1)^2$ (d) None of the above
- (3) A bowl contains 10 balls, of which 4 are white and 6 are red. If three balls are selected at random, with replacement from the bowl. Let X be the number of red balls drawn then the standard deviation of X is
(a) 0.28 (b) 0.8485 (c) 0.1515 (d) 0.72
- (5) Let X be a Poisson variate with variance 25, determine the approximate value of $P(X > 32)$
(a) 0.0918 (b) 0.0548 (c) 0.9452 (d) 0.4082
- (6) Let $X \sim U(a, 4)$ variate with variance 3. What will be the value of a ?
(a) -2 (b) 10 (c) 3 (d) None of the above

- Q.2 (a) Let X denotes the no. of failures before a success in an independent trial with constant prob. of success p for each trial. Name the distribution of X . Find the mean and variance of X .
- (b) From a group of 5 male and 2 female students, 3 students are selected at random to form a committee to organize a class tour.
- (i) Which method do you prefer for selection – With Replacement or Without Replacement? Justify?
- (ii) Find the Probability distribution of X where X is no. of female students selected.
- (iii) Find the prob. that all the three students selected are of same gender.

OR

- Q.2 (a) Derive Poisson distribution as a limiting case of Binomial distribution.
- (b) Do as directed:
- (i) The constant probability of success in a series of independent trials is $1/k$. Given that first success is achieved at X^{th} trial, then find $E(X)$
- (ii) A multiple-choice test has 10 questions, with each question having 3 possible answers. Suppose a student randomly guesses the answer of each question. What is the probability that the student will answer all even questions correctly?
- Q.3 (a) Let $X \sim U(-2, 2)$. Show that all the odd order moments are zero.
- (b) Define Beta distribution of first kind. Obtain μ'_r and hence $V(X)$.

OR

- Q.3 (a) Define Exponential distribution. State and prove forgetfulness property of exponential distribution.
- (b) The pregnancy duration of women is assumed to be normally distributed with a mean of 266 days and a standard deviation of 16 days. If 4 women were randomly selected, what is the probability that (a) exactly 2 (b) at least 3, of them have pregnancy duration between 248 to 272 days?

Roll No: _____



Supervisor Sign: _____



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Bachelor of Science (Semester VI) Quiz Test - 2026
US06MISTA01: Probability Distributions

Time: _____

Date: 09-03-2026 (Monday)

Total marks: 05

Fill in the blanks	
1	A standard normal distribution has mean _____ and variance _____
2	The variance of a geometric distribution is _____
True or False	
3	A binomial distribution can take any integer value from 0 to infinity.
4	A normal distribution can take only positive values.
5	The mean of a geometric distribution is always greater than 1