

Total No. of Printed Pages: 02

B - 2214

SUBJECT CODE NO: -B - 2214
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. Pattern - 2013 (T.Y SEM VI)
Examination November / December 2025
Mathematics 1) Mathematical Statistics-II - MAT -603

[Time: 1:30 Hours]

[Max. Marks: 50]

Please check whether you have got the right question paper.

N. B

- (i) All questions are compulsory
- (ii) Figures to the right indicate

Q1 A) Attempt any one of the following:

(a) State and prove the addition theorem of expectation.

08

(b) If X and Y are two independent random variables, show that:
 $V(ax+by) = a^2 \text{var}(x) + b^2 \text{var}(y)$

08

B) Attempt any one of the following:

(a) Find the expectation of the sum, and the product, of number points on 'n' dice when thrown.

07

(b) Find the mean and Variance of binomial distribution.

07

Q2 A) Attempt any one of the following

(a) prove the following recurrence relation for moments of the Poisson distribution:

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$$\mu_{r+1} = r \cdot \lambda \mu_{r-1} + \lambda \frac{d\mu_r}{d\lambda}$$

(b) Find the mean and Variance of exponential distribution

08

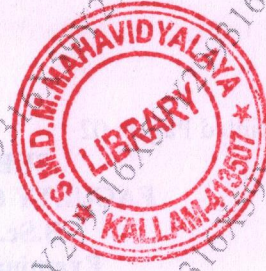
B) Attempt any one of the following:

(c) In a Poisson frequency distribution, frequency corresponding to 3 successes is $\frac{2}{3}$ times frequency corresponding to 4 successes. Find the mean and standard deviation of the distribution.

07

(d) In a binomial distribution Consisting of 5 independent trials probabilities of 1 and 2 successes are found to be 0.4096 and 0.2048 respectively. Find the parameter 'p' of the distribution.

07



B - 2214

Q3 A) Attempt any one the following:

- (a) Prove that, if x is a random Variable, then
 $V(ax+b) = a.v(x)$ Where 'a' and 'b' are constants. 05
- (b) If X and Y are random Variables and a, b, c, d are any numbers such that, $a \neq 0$,
 $c \neq 0$ then prove that: 05
$$r(ax+b, cy+d) = \frac{ac}{|ac|} r(x,y)$$

B) Attempt any one of the following:

- (c) A Poisson distribution has a double mode at $x=1$ and $x=2$. What is the probability that x will have one or the other of these two values? 05
- (d) Three urns contain respectively 05
3 green and 2 white balls,
5 green and 6 White balls
2 green and 4 White balls.
one ball is drawn from each urn. Find the expected number of white balls drawn out.

Q4 choose the correct alternative of the following

10

- i. The value of the expectation of the number on a die when thrown is

- (a) $\frac{11}{2}$ (b) $\frac{2}{3}$
(c) $\frac{1}{3}$ (d) $\frac{7}{2}$

- ii. Which of the following is true?

- (a) $E(x^{1/2}) = [E(x)]^{1/2}$ (b) $E(\log x) = \log(E(x))$
(c) $E\left(\frac{1}{x}\right) = \frac{1}{E(x)}$ (d) $E(ax+b) = a E(X) + b$

- iii. The mean and and Variance of the binomial distribution are

- (a) np and np (b) np and pq
(c) np and npe (d) p and q

- iv. The moment generating function for the rectangular distribution:

$$f(x) = \frac{1}{2a}, -a < x < a \text{ about origin is } \dots\dots\dots$$

- (a) $\frac{\sinh}{at}$ (b) $\frac{\cosh}{at}$
(c) at (d) $\sinh at$

- v. Two independent variables are....

- (a) Correlated (b) uncorrelated
(c) always less than zero (d) always equal to zero