2015

STATISTICS

(Major)

Paper : 3.2

(Distribution – I)

Full Marks – 60

Time – Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following questions : 1×7=7

    (a) State the relationship between mean and variance of negative binomial distribution.

    (b) Name the discrete distribution for which mean and variance have the same value.

    (c) The mean and variance of a binomial variate X with parameter n and p are 16 and 8. Find $P(X = 0)$.

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(d) Write down the p.m.f of Hyper-Geometric distribution.

(e) State the conditions under which Poisson distribution tends to Normal distribution.

(f) State the additive property of Gamma distribution.

(g) Let $X \sim N(0, 1)$ and $Y \sim N(0, 1)$ be independent random variables. Then identify the distribution of X/Y.

2. Answer the following questions : $2 \times 4 = 8$

(a) The random variable X is $N(m, \sigma)$. Find the distribution of $Y = aX+b$ where a, b are constants.

(b) Find the mean of the Poisson distribution.

(c) State the p.d.f of a standard Laplace distribution.

(d) Obtain the m.g.f of Geometric distribution.

3. Answer any *three* of the following : $5 \times 3 = 15$

(a) Write down the p.m.f of discrete uniform distribution. Obtain its mean.

(b) Prove that the sum of two independent Poisson variates is a Poisson variate.

(c) Determine the mode of the binomial distribution for which the mean is 4 and variance 3.

(d) Show that for a normal distribution, mean = mode.

(e) If X is normally distributed with zero mean and variance σ^2, find the p.d.f of $Y = e^X$.

4. Answer any *three* of the following : $10 \times 3 = 30$

(a) If X is a Poisson variate with parameter 'm' and Y is another variable whose conditional distribution for a given X is given by :

$$P(Y = r / X = x) = \binom{x}{r} p^r (1-p)^{x-r} ; v = 0, 1, 2, \dots x \ ; \text{op}$$

then show that the unconditional distribution of Y is a Poisson distribution with parameter mp.

(b) Obtain the first four cumulants of Binomial distribution.

(c) Obtain the Poisson distribution as a limiting case of the Negative Binomial distribution.

(d) "The role of Cauchy distribution often lies in providing counter examples". Justify.

(e) Show that the ratio of two independent Gamma variar is a beta variar of second kind.