27/5/17 Eve

This question paper contains 4+1 printed pages] Roll No. S. No. of Question Paper : 2017 GC-4 Unique Paper Code 62371201 Statistical Methodology Name of the Paper Name of the Course : B.A. (Program) Statistics : II Semester Maximum Marks: 75 **Duration : 3 Hours** (Write your Roll No. on the top immediately on receipt of this question paper.) Attempt Six questions in all including Q. No. 1 Which 1 is compulsory.

Simple calculator can be used.

Find the distribution function for the following probability (a)distribution :

$\mathbf{X} = \mathbf{x}$	E.C.		$\mathbf{P}(\mathbf{X} = \mathbf{x})$	
0		1.000	1/16	
· 1			4/16	
2			6/16	
3	ক কেন্দ্র্যু	$ s (\tilde{a}) $	4/16	
4			1/16	

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If X and Y are two independent random variables with 6. (a)

(4)

probability density functions.

$$f(x) = \frac{1}{\sqrt{2\pi}} e^{-\frac{x^2}{2}}, -\infty < x < \infty$$
 and

$$f(y) = \frac{1}{\sqrt{8\pi}} e^{-\frac{(y-5)^2}{8}}, -\infty < y < 0$$

respectively, find the variance of random variable

$$T = 2X + Y.$$

The mean yield for one-acre plot is 662 kilos with s.d. (b)

32 kilos. Assuming normal distribution, how many one-

acre plots in a batch of 1000 plots, would you expect

to have yield (i) over 700 kilos, and (ii) below 650 kilos?

Given $P(0 \le Z \le 1.19) = 0.3830$, $P(0 \le Z \le 0.38) = 0.1480$,

where Z is a standard normal variate.

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(b) m.g.f. of a random variable X is $M_x(t) = 0$ exp {3(e^t - 1)}. Using the uniqueness property of m.g.f.'s identify the distribution. Find its parameters and coefficient of skewness.

(2)

- (c) If X and Y are independent standard normal variates, then find the distribution of X - 2Y.
- (d) Find the rth moment about origin for beta distribution
 of second kind.
- (e) Determine the binomial distribution for which mean is4 and variance is 3. Also obtain its mode. 3,3,3,3,3
- (a) Prove that geometric mean G of the following distribution

 $dF = 6(2-x)(x-1)dx, 1 \le x \le 2$

is given by $6 \log (16G) = 19$.

(b) Find m.g.f. of the standard binomial variate $\frac{x-np}{\sqrt{npq}}$

and show that it tends to $\exp(t^2/2)$ as *n* tends to

infinity.

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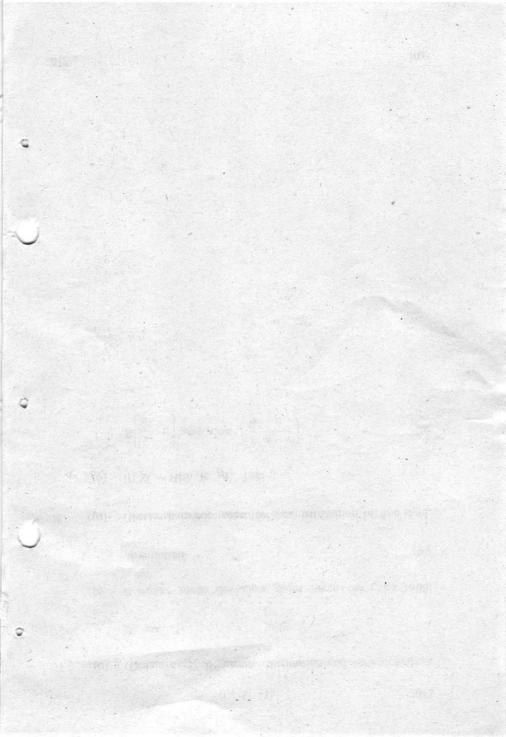
In four tosses of coin, let X be the number of heads. 3. (a) Tabulate 16 possible outcomes with the corresponding values of X. Derive the probability distribution of X and hence, calculate the expected value of X. Show that in Poisson distribution with unit mean, mean (b) deviation about mean is (2/e) times the standard deviation. 6,6 Define negative binomial distribution. Compute its m.g.f. 4. (a)and hence compute its mean and variance. (b) State and prove De-Moivre's theorem. 6,6 For geometric distribution $p(x) = 2^{-x}$; x = 1, 2, 3..., prove 5. (a) that Chebychev's inequality gives $P\{|x-2| \le 2\} > \frac{1}{2}$, while the actual probability is 15/16. Show that hypergeometric distribution with parameters (b)(N, M, n) tends to binomial distribution with parameters

(3)

(n, p) as $N \to \infty$ and $\frac{M}{N} \to p$ 6,6

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- 7. (a) Obtain m.g.f. of gamma distribution and hence compute β_1 and β_2 .
 - (b) Compute mean deviation about mean for exponential distribution.
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 - (a) Obtain

8.

Obtain harmonic mean for beta distribution of first kind.

(b) If $X \sim Bin(n, p)$, find :

$$E\left[\frac{x}{n}-p\right]^2$$
 and Cov $\left(\frac{x}{n},\frac{n-x}{n}\right)$. 6,6