WEST BENGAL STATE UNIVERSITY

B.Sc. Honours Part-II Examination, 2020

STATISTICS

PAPER: STSA-III

Time Allotted: 2 Hours | Full Marks: 50

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.
All symbols are of usual significance.

GROUP-A

Answer any *one* from Question No. 1 and 2

1. (a) What do you mean by absolute and relative error? Compute relative error in computing $u = x^2 + 5x$ for $x = \sqrt{2} = 1.414$. 5

   (b) Show that by taking difference once the degree of n-th degree polynomial will be reduced by unity. 5

2. (a) Show that X and Y are independent for the following p.d.f. $f(x, y) = 12xy(1-y),\ 0 < x,\ y < 1$. 5

   (b) Define the conditional and marginal p.d.f. in a bivariate case. 5

GROUP-B

Answer any *two* from Question No. 3 to 6

3. (a) Derive Newton's backward interpolation formula. Find the error term in Newton's backward interpolation formula. 6+4

   (b) Prove that $E = 1 + \Delta$. Show that $\frac{\Delta^2}{E} e^x \times \frac{Ee^x}{\Delta^2 e^x} = e^x$. 5

   (c) Describe Newton-Raphson formula for solution of equation in one unknown and derive its condition of convergence. 5

4. (a) Show that all central moments of a normal distribution can be expressed in terms of the standard deviation and obtain the expression in the general case. 5

   (b) Show that, $1 - \Phi(x) < \phi(x)/x$. 5

   (c) If $X \sim P(\lambda)$, find the MGF of X. Show that binomial distribution tends to Poisson distribution under certain conditions. 5+5

5. (a) Deriving clearly the distribution of the test statistic, describe the test procedure for testing mean of two univariate normal distribution when variance is (i) known and (ii) unknown. 10

(b) Let X has the p.d.f $f(x) = (\theta + 1)x^{\theta}$, $0 < x < 1$; $\theta > -1$. Show that $\left[\frac{-(n-1)}{\sum \log x_i} - 1\right]$ is unbiased estimator of θ. 5

(c) Find the maximum likelihood estimator of p where $X \sim B(n, p)$. 5

6. (a) If $X \sim B(n, p)$, develop a recursive relation for central moments of X. 5

(b) Deduce that m.g.f. of standard gamma variate with parameter λ tends to $e^{-t^2/2}$ as $\lambda \to \infty$. 5

(c) Let $X \sim N(\mu, \sigma^2)$. Construct the power function of the test $H_0 : \mu = \mu_0$ vs. $H_0 : \mu \neq \mu_0$. Also, obtain $100(1-\alpha)\%$ confidence intervals for the parameter μ when σ^2 is unknown. 5+5

N.B. : *Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.*

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