

B. N .BANDODKAR COLLEGE OF SCIENCE, THANE
 S.Y.B.Sc SEMESTER IV EXAMINATION ~~MARCH~~ MARCH 2014
 STATISTICS USST401

DURATION:2 HOURS

MARKS :60

N.B.: 1 All questions are compulsory.
 2 Use of simple calculator is allowed.

Q.1 (a) Attempt any ONE

- 1) If r.v.X. follows β distribution of first kind. i) Obtain an expression for its rth raw moment. ii) Hence find its mean, variance, harmonic mean 7
- (2) A r.v X has triangular distribution with p.d.f as 7

$$f(x) = \begin{cases} \frac{a+x}{a^2} & -a < x < 0 \\ \frac{a-x}{a^2} & 0 < x < a \\ 0 & \text{otherwise} \end{cases}$$

find its m.g.f and hence or otherwise mean .

(b) Attempt any ONE

- (1) Write p.d.f. of X having Cauchy ($\mu \lambda$), obtain an expression for its c.d.f. hence obtain its quartile deviation. 8
- (2) X_1, X_2, \dots, X_n are n independent identically distributed (i.i.d) r.vs with common distribution exponential with parameter θ . Find its m.g.f Hence derive the p.d.f of their sum $Y = \sum_{i=1}^n X_i$. Write the p.d.f of Y.. Find its mean and variance. 8

Q.2 (a) Attempt any ONE

- (1) State and prove central limit theorem. 7
- (2) A r.v X is lognormal distribution with parameters μ and σ^2 . Obtain $E(X)$ and $V(X)$ 7

(b) Attempt any ONE

- (1) Obtain an expression for cumulant generating function (c.g.f) of normal distribution with mean μ and variance σ^2 , find the expression for $2r^{\text{th}}$ central moment μ_{2r} of X. Derive the recurrence relation for central moments. 8
- (2) X_1, X_2, \dots, X_n are i. i. d Normal r. v s with parameters μ_i and σ_i^2 derive the 8

distribution of $\sum_{i=1}^n a_i X_i$, Where a_i s are constants not all zero.

Q.3 (a) Attempt any ONE

- (1) Discuss any one application of i) Chi-square distribution and ii) F distribution. 7
- (2) Derive the p.d.f of F distribution and state its any one property. 7

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(b) Attempt any ONE

(1) For Chi square distribution i) derive c.g.f, hence find ii) its moments
iii) find γ_1 and γ_2 . 8

(2) Derive an expression for p.d.f. of t as a ratio $\frac{U}{\sqrt{\frac{V}{n}}}$ where $U \rightarrow N(0,1)$ 8

and is independent r.v V , having Chi square distribution with n degrees of freedom.

Q.4 Attempt any THREE

(1) $X \rightarrow G(\theta, n_1)$ an independent r.v $Y \rightarrow G(\theta, n_2)$, find the distribution of
 $V = \frac{X}{Y}$ 5

(2) $X \rightarrow C(0,1)$, find p.d.f of $Y = X^2$ 5

(3) Discuss any ^{one} applications of t- distribution. 5

(4) Obtain 100 $(1 - \alpha)\%$ confidence interval for i) population variance. ii) Ratio of two population variance. 5

(5) Find sampling distribution of i) sample proportion, and ii) difference between sample means. stating your assumptions clearly. 5

(6) Show that limiting distribution of t is normal. 5
