S7 cats

B. N .BANDODKAR COLLEGE OF SCIENCE, THANE
IV SEMESTER END EXAMINATION MARCH 2017
STATISTICS USST401

DURATION:2 ½HOURS **MARKS** :75

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 with parameters m,n. 10
i)Obtain an expression for its r^{th} raw moment.
ii)Hence find its mean, variance and harmonic mean.

(2) i) Write down p.d.f. of X having Cauchy (μ ,λ) 10
ii)Obtain an expression for its distribution function (d.f.)
iii)Obtain i^{th} percentile hence its Quartile deviation.

(b) Attempt any ONE

(1) i)A r.v. X has U(a, b).Find its moment generating function (m.g.f) and hence its r^{th} raw moment. 10
ii)X,Y are independent r.v with common distribution U(0, 1).Derive the p.d.f of X-Y.Name the distribution.

(2) i)Obtain an expression for cumulant generating function (c.g.f) of Gamma(n , θ) distribution . 10
.ii) Hence find its β_1 and β_2 .

Q.2 **(a) Attempt any ONE**

(1) State and prove central limit theorem. Give one of its applications 10

(2) Find mean ,mode and median for lognormal distribution with parameters (μ , σ^2). ii)Establish the relation between them. 10

(b) Attempt any ONE

(1) Obtain an expression for moment generating function of normal distribution and obtain expression for $2r^{th}$ central moment μ_{2r}. 10

(2) i)Obtain an expression for mean deviation about mean for normal distribution with parameters (μ , σ^2). 10
ii)Find the distribution of sample mean when sample is drawn from
A)Normal distribution with mean μ and variance σ^2.
B)Any Population with mean μ and variance σ^2.State the assumptions clearly.

Q.3 **(a) Attempt any ONE**

(1) i)Derive the p.d.f of F distribution with n_1 , n_2 degrees of freedom(d.f) 10
ii)Find its mode.

(2) i)State and prove additive property of Chi square r. v s. 10
ii) Discuss the test of independence of attribute in case data are presented in 2X2 contingency table.
iii)If one of the cell frequencies is less than 5 then how the test statistic modifies in above test?

(b) **Attempt any ONE**

(1) Derive the distribution of ratio $\frac{U}{\sqrt{\frac{V}{n}}}$ where U has N(0,1) and is independent of V having chi square with n d.f..Name the distribution and state its any one property 10

(2) i)Explain the test $H_0: \sigma_1^2 = \sigma_2^2$ against all possible alternatives ,stating your assumptions clearly. 10

ii)Obtain 100 (1 - α)% confidence interval for population mean μ when sample is small, stating your assumptions clearly.

Q.4 **Attempt any THREE**

(1) Derive sampling distribution of difference between sample proportions, stating your assumptions clearly. 5

(2) If r.v,X follows β distribution of second kind with parameters m,n.. Obtain an expression for its harmonic mean. 5

(3) A r.v has exponential distribution with mean θ. Show that P[X > t+s / X > t] = P[X > s],for any t, s ≥ 0. 5

(4) X,Y are independent standard normal find p.d.f of X/Y. 5

(5) Describe Paired –t test. State underlying assumptions. 5

(6) If F follows F- distribution with (n_1,n_2) d. f. Find $E(F^r)$ .Hence find its mean. 5

****