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M.Sc.(Statistics) Sem.4 : નોંધ : Subcode: 3580

૧. દરેક પ્રશ્નનો [a] અથવા [a(i)] અને [a(ii)] જ લખવાના રહેશે.
૨. પ્રશ્ન : ૧[a] અથવા ૧[a(i)] અને ૧[a(ii)] તથા ૨[a] અથવા ૨[a(i)] અને ૨[a(ii)] ના 14 માર્કસ ના બદલે ૧૮ માર્કસ રહેશે.
૩. પ્રશ્ન : ૩[a] અથવા ૩[a(i)] અને ૩[a(ii)] તથા ૪[a] અથવા ૪[a(i)] અને ૪[a(ii)] ના 14 માર્કસ ના બદલે ૧૭ માર્કસ રહેશે.
૪. દરેક પ્રશ્નનો પ્રશ્ન નં ૧(b), પ્રશ્ન નં ૨(b), પ્રશ્ન નં ૩(b) તથા પ્રશ્ન નં ૪(b) (ટુંકા પ્રશ્નો) વિદ્યાર્થીએ લખવાના નથી.

Q1 a) Let X be a binomial variable with p.m.f. $f(x \mid \theta) = {}^{2}C_{x}\ \theta^{x}\ (1-\theta)^{2-x}$; $x = 0,1,2$. Parametric space $\cong \{ \theta_1 = 1/3, \theta_2 = 2/3 \}$ and $\varepsilon = \{ a_1, a_2 \}$ and loss function is 14

Loss table

	a_1	a_2
θ_1	4	1
θ_2	-2	0

List all non randomized decision rules. Prepare the risk table. Find a minimax decision rule. Identify admissible decision rules.

OR

Q1 a) Let $L(\theta,a) = (\theta-a)^2$ and distribution of X is $N(\theta,1)$. Find the Bayes decision rule for θ by considering the $N(0, \sigma^2)$ as prior distribution of θ. 7

a) Let parametric space be R^+, $L(\theta,a) = (\theta-a)^2$ and distribution of X be Poisson with parameter $\theta>0$, find Bayes rule when prior p.d.f of θ to be gamma (α, β). Also determine Bayes risk. 7

Q1 b) 4

(i) write the expression for squared error loss function
(ii) Write the expression for absolute error loss function
(III)Define Risk function, Loss function, admissible Bayes rule , Bayes

rule
(iv).Define Prior distribution
(v)what is bayes rule
(vi)what do you mean by Posteriordistribution

Q2 A) Derive an expression for pdf of a life time model using the given failure rate.A failure rate function of Life time distributions is given as following. Hence, obtain reliability functions, probability density functions and MTTF 14

$h(t) = 1/\theta,\ t>0,\ \theta>0.$

OR

Q2 a (i) Suppose n items are put on test and the experiment is terminated when we observer r-th failure. Based on this data obtain the maximum likelihood estimate of mean $\theta>0$ of exponential life time model. 7

a (ii)Find the reliability function, hazard function and mean time to failure(MTTF) of the life time model 7
$f(x) = (\alpha/\beta)\ (x/\beta)\alpha\text{-}1 \exp\ (-\ (x/\beta)\alpha),\ x,\alpha,\beta>0.$

Q2 b) (i) What is Reliability ? 4
(ii) What is cut set of System.
(III)Draw configuration of Parallel system with three component
(iv) Write structure function of series system with two components
(v) Draw configuration of Bridge system
(vi) Draw configuration of series cum Parallel system with three component.

Q3 a) Derive Reliability function of (i) series-system (ii) parallel- system . Also derive structure functions of them. Two components with reliability .9 and .8 are arranged into series, What will be the reliability of the system. 14

OR

a) (i) Derive reliability of a bridge system with it configuration 7

a) (ii) Derive Reliability function of k out of n system. 7

Q3 b) (i) write reliability function of exponential life time distribution with mean $\theta>0$ 3

(ii) write likelihood function when, experiment is terminated after 4th Failure and life time distribution is exponential $\theta>0$.

(iii)State one property of exponential life time model

(iv)Define MTTF

(v)Define hazard function

Q4 a) Describe single sampling plan for variables when the quality characteristic is assumed to follow normal distribution. Obtain its O.C function when upper specification limit is given and Process standard deviation is unknown. 14

OR

a) (i) Describe double sampling plan procedures for attributes and find out the expression for OC function. 7

a) .(ii) 7

Describe single sampling plan for attributes with illustration. Find out the expression for OC and ASN functions

3

Q4 b) (i) In single sampling plan for variables, quality characteristic is assumed to follow which distribution?

(ii) what is OC function?

(iii)Define c in single sampling plan for attribute.

(iv)Define AQL

(v)Define producer's Risk