TYBSC STATS V

Duration : 3 hrsMax Marks :100

N.B. : 1) All questions are compulsory.
2) Figures to the right indicate marks for each question.
3) Use of calculators is allowed.

Q.1 a) i) Define 1) Population 2) Mutually exclusive events **(04)**
ii) State and Prove addition theorem on probability for two events. **(06)**
b) State and Prove State and Prove theorem on Probability of Realization of atleast m events out of N. **(10)**

OR

p) State and Prove Baye's Theorem on Probability. **(10)**
q) N letter are put in N self-address envelopes randomly, find the probability of No match. **(10)**

Q.2 a) State and Prove Markov's Inequality. **(10)**
b) i) Explain significance of Tchebyshev's inequality. **(05)**
ii) Does there exist a variable X for which **(05)**
$P[\mu - 2\sigma < X < \mu + 2\sigma] = 0.6$

OR

p) i) For a random variable X having mgf $M_x(t)$, $t \in R$ show that **(05)**
$P[tx \geq S^2 + \log_e M_x(t)] \leq e^{-s^2}$. **(05)**
ii) Show that Mean deviation ≤ Standard deviation.
q) State and Prove Boole's Inequality. **(10)**

Q.3 a) Define and Interpret trinomial distribution. **(10)**
b) i) Obtain Marginal mgf from multinomial distribution and hence marginal distribution. **(05)**
ii) Let joint pdf of X and Y be given as, **(05)**
$f(x) = e^{-y}$; $0 < x < y < \infty$
$= 0$;o.w.
Obtain joint mgf of X and Y.

OR

p) Prove that X_1 and X_2 are independent r.v.s if and only if their joint mgf can be expressed as the product of the marginal mgf. **(10)**
q) If $(X_1, X_2) \sim TN(n, p_1, p_2)$ then obtain correlation coefficient between X_1 and X_2. **(10)**

Q.4 a) Let sample of size n = 5 be drawn from exponential distribution with mean 1 ; Obtain joint density function of Y_1 and Y_3. **(10)**
b) i) Define Order statistic **(03)**
ii) Obtain marginal distribution of n^{th} order statistic. **(07)**

OR

p) Obtain derivation for joint distribution of r^{th} and s^{th} order statistic. **(10)**

q) i) Let sample of size n = 10 be drawn from uniform distribution over the range $(0, \theta)$. **(07)**
Obtain pdf of 1^{st} and highest order statistic.

ii) Define joint distribution of all n order statistics. **(03)**

Q.5 Attempt any two sub questions

a) i) State rules of Maxwell Boltzman distribution formula. **(05)**

ii) In a hand of card play, find probability of three kings given that a hand has atleast two kings. **(05)**

b) State and Prove Cantelli Lemma. **(10)**

c) If $(X_1, X_2) \sim TN(n, p_1, p_2)$ then obtain conditional distribution of X_1/X_2. **(10)**

d) State steps for finding distribution of range. **(10)**

***** **ALL THE BEST** *****