B. N. BANDODKAR COLLEGE OF SCIENCE, THANE - 400 601.

FIRST TERM EXAMINATION OCT. - 2010

F. Y. B. Sc.

TIME : 2 Hrs.

SUBJECT : STATISTICS - II **MARKS :** 60

N. B. :
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Use of simple calculater is allowed.

Q.1 **a)** Define (i) Sample space (ii) Exhaustive events (iii) Mutually Exclusive events. [3]

b) Attempt ANY THREE. [12]

1. A, B are two events of the sample space show that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$. Write corresponding expression From three events.
2. Write Statistical and Mathematical definitions of probability.
3. Given a joint probability mass function (p.m.f.) of random variables (r.v) X, Y as

Y \ X	-1	0	1
0	0.2	0.2	0
1	0.2	0.2	0.2

   Obtain i) Marginal p.m.f. of r.v. Y
   ii) Conditional p.m.f. of r.v. X given Y = 0
   iii) Verify independence of r.v.s X, Y
4. A r.v. X has Binominal distribution with parameter n, p, find its mean.
5. Fill in the blanks.
   i) Raw moments are affected by change of ____________ and __________
   ii) Central moments are affected by change of ________ but not by ______
   iii) μ_2 is ________ and $\sqrt{\mu_2}$ is ________
   iv) First raw moment is ____________ and first central moment is _______

P.T.O.

Q.2 **a)** Define conditional probability of B given A. Find expression for P (B /A) in each of following cases (i) A, B are mutually exclusive (ii) A, B are independent (iii) A is subject of B. [3]

b) Attempt ANY THREE : [12]

1) $P(A \cap B) = 0.2$, $P(A) = 0.6$, $P(A / B) = 0.4$ Find (i) $P(B / \bar{A})$ (ii) $P(A \cup B)$ (iii) $P(\bar{A} \cap B)$
2) Explain the concept of partition of the sample space. Give an example.
3) State and prove Bayes' theorem.
4) If A and B are independent events show that (i) $P(\bar{A} \cap B) = P(\bar{A})\, P(B)$ (ii) $P(\bar{A} \cap \bar{B}) = P(\bar{A})\, P(\bar{B})$
5) State and prove multiplication theorem on probability .

Q.3 **a)** Define cumulative distribution function (c.d.f.) of r.v. X and state its two properties. [3]

Q.3 **b) Attempt ANY THREE :** [12]

1) Prove that E (XY) = E (X) E (Y) if X, Y are independent.
2) Define covariance between X, Y. Show that Cov (XY) = E(XY) – E(X) E(Y). If X, Y are independent what is Cov (X, Y)?
3) Define the terms (i) discrete r.v. X (ii) p.m.f. of r.v . (iii) Expectation of r.v. (iv) Standard deviation (S.D.) of r.v.
4) Write formula for correlation coefficient between X, Y. State various types of correlation giving illustration for each.
5) Complete the following using correct option from bracket.
   i) Sign of γ_1 depend on [β_1, μ_3]
   ii) $\mu'_3 - 3\mu^1_2 \ \mu^1_1 + 2\mu^{1\,3}_1$ is [μ_4, μ_3]
   iii) E (aX + bY) is [a E(X) + b(Y), E(X) + E(Y)]
   iv) S.D. (CX) is [C S. D. (X), C2 S.D. (X)]

Q.4 **a)** A r.v X has uniform distribution over 1, 2, 3, 4, 5 and 6. Find mean, variance and μ_3 of X. [7]