Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS / BBA(H), BIRM, BSCM / SEM-2 / BBA-203 / 2011

2011

STATISTICS - II

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

$10 \times 1 = 10$

i) What is the probability that a leap year will contain 53 Sundays ?

a) $\frac{1}{7}$ b) $\frac{2}{7}$

c) $\frac{5}{7}$ d) None of these.

ii) If 3 dice are thrown simultaneously, the total number of possible outcomes are

a) 18 b) 216

c) 36 d) none of these.

iii) The expectation of the distribution

x :	1	2	3	4	5
$P(x)$:	0·2	0·1	0·2	0·3	0·1

is given by

a) 3 b) 2

c) 2·5 d) none of these.

iv) Which of the following statements is false ?

a) $P(A \cap B) = P(A)\,P(B/A)$

b) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

c) $P(A \cap B) = P(A)P(B)$

d) $P(A^C) = 1 - P(A)$.

v) Let $x \sim N(10, 5^2)$, then $E(2x+3)$ is equal to

a) 13 b) 10

c) 23 d) none of these.

vi) Let $X \sim N(10, 5^2)$ then $E(2X+3)$ is equal to

a) $\frac{5}{4}$ b) $\frac{5}{2}$

c) 5 d) none of these.

vii) Type-II error of testing a hypothesis reflects

a) rejecting a true null hypothesis

b) accepting a false alternative hypothesis

c) accepting a false null hypothesis

d) none of these.

viii) The p.d.f. of a continuous distribution is as follows :

$f(x) = 2e - kx$, $0 < x < \infty$

then the value of k is

a) 0 b) 2

c) 1 d) none of these.

ix) The frequency distribution of 100 observations are as follows :

x :	1	2	3	4	5	6
frequency :	20	10	k	45	7	2

The value of k is

a) 16 b) 10

c) 18 d) none of these.

x) The mean of uniform distribution

$f(x) = k$, $a \le x \le b$ is

a) 0 b) $(b-a)/2$

c) 1 d) $\frac{a+b}{2}$.

xi) For which distribution mean, median and mode are same ?

a) Normal b) Binomial

c) Poisson d) None of these.

xii) A binomial distribution with parameters n and p may be approximated by a Poisson distribution provided

a) n is small and p is large

b) n is large and p is small

c) n is large and p is large

d) n is small and p is small.

xiii) Critical region is a region of

a) acceptance of null hypothesis

b) rejection of null hypothesis

c) indecision

d) none of these.

xiv) Which of the following is the 'non-parametric' test ?

a) χ^2-test b) t-test

c) z-test d) None of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. A random variable X follows Poisson distribution such that $P(X = 1) = P(X = 2)$.

Find the mean and variance of the distribution.

3. A random variable X has the following probability distribution:

X	0	1	2	3	4	5	6	7	8
$P(X)$	k	$3k$	$5k$	$7k$	$9k$	$11k$	$13k$	$15k$	$17k$

i) Find the value of k

ii) Find $P(X < 3)$ and $P(0 < X < 4)$.

4. Write short notes on the following :

a) Simple random sampling

b) Chi-square test.

5. What are the properties of good estimator ? For $N(\mu, \sigma^2)$ distribution what is the unbiased estimator of μ ?

6. A random sample of the height of 100 students from a large population of students is drawn. The average height of the students in the sample is 5·6 feet while S.D. is 0·75 feet. Find 95% confidence limits for the average height of all the students in the population.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) State and prove Baye's theorem.

b) There are two identical boxes. First box contains 3 white balls, 7 red balls and 5 green balls. Second box contains 5 white balls, 3 red balls and 10 green balls. One box is chosen at random and a ball is drawn from it and it is found to be green. What is the probability that the ball is drawn from first box ? 9 + 6

8. a) Define with an example, a continuous random variable.

b) Joint probability mass function of two random variables X and Y is given below :

X \ Y	1	2	3	Total
1	2/21	3/21	4/21	9/21
2	1/21	2/21	1/21	4/21
3	3/21	4/21	1/21	8/21
Total	6/21	9/21	6/21	1

i) Write the marginal distribution function X.

ii) Find the covariance between X and Y.

c) If X is a random variable, then prove that $V(ax+b) = a^2 V(X)$. 4 + 8 + 3

9. a) The average number of misprints per page of a book is 2. What is the probability that a particular page is free from misprint ? If the book contains 1000 pages, how many of them contain more than 2 misprints ?

b) Use Neyman-Pearson Lemma to obtain the best critical region for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta > \theta_0$, in case of a normal population $N(\theta, \sigma^2)$, where σ^2 is known. 7 + 8

10. a) What are the properties of MLE ?

b) Show that the sample mean based on a sample random sample with replacement (SRSWR) is an unbiased estimator of the population mean.

c) Obtain the maximum likelihood estimate (MLE) of the parameter of a Poisson distribution. 4 + 5 + 6

11. a) What is Analysis of Variance ?

b) Describe its usefulness in test of significance.

c) Prepare ANOVA table for the following one way classified data and comment.

Weight of balls (gm)

	Machine 1	Machine 2	Machine 3
	2·0	1·8	3·0
	2·2	2·2	2·8
	1·7	2·0	3·2
TOTAL	5·9	6·0	9·0

(Given $F_{0·05}$ = 5·14 for (2, 6) d.f.) 3 + 3 + 9

==========