Name :	
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Invigilator's Signature :	

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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 ?

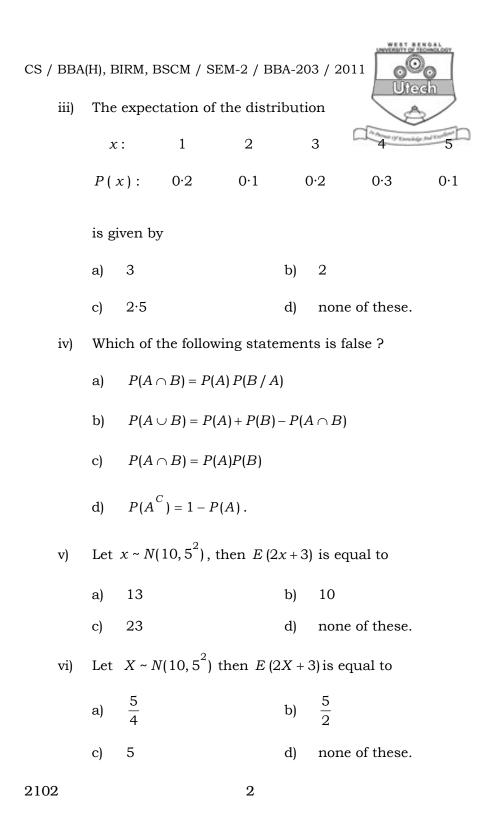
a)	$\frac{1}{7}$	b)	$\frac{2}{7}$
c)	$\frac{5}{7}$	d)	None of these.

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

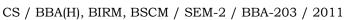
a)	18	b)	216
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c) 36 d) none of these.

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vii)	Тур	e-II error	of testir	ng a hy	pothe	esis reflects	0	
	a)	rejecting	; a true	null hy	vpoth	esis	WEarwidge Jul Dat	5-1)
	b)	accepting a false alternative hypothesis						
	c)	acceptin	g a false	e null ł	ıypot	hesis		
	d)	none of	these.					
viii)	The	p.d.f. of a	a contin	uous d	istrit	oution is as :	follows :	
	f(x)=2e-kx	, 0 < <i>x</i>	$< \infty$				
	the	n the valu	e of <i>k</i> is	\$				
	a)	0			b)	2		
	c)	1			d)	none of the	ese.	
ix)		frequenc	y distri	bution	of 1	.00 observa	tions ar	e as
		x:	1	2	3	4	5	6
	frec	uency :	20	10	k	45	7	2
	The	value of <i>i</i>	k is					
	a)	16			b)	10		
	c)	18			d)	none of the	ese.	
x)	The	mean of	uniform	distrib	oution	n		
	f(x)=k , a	$\leq x \leq b$	is				
	a)	0			b)	(b-a)/2		
	c)	1			d)	$\frac{a+b}{2}.$		
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- xi) For which distribution mean, median and mode a 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.

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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	7 <i>k</i>	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

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- 8. a) Define with an example, a continuous random variable.
 - b) Joint probability mass function of two random variablesX and Y is given below :

Y X	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 is2. 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

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- 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
	$2 \cdot 2$	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
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