

**Code: 9FBS101**

MCA I Semester Supplementary Examinations, October/November 2013  
**PROBABILITY AND STATISTICS**

Time: 3 hours

Max. Marks: 60

Answer any five questions  
All questions carry equal marks

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- 1 (a) Two digits are selected at random from the digits 1 through 9.  
(i) If the sum is odd, what is the probability that 2 is one of the numbers selected?  
(ii) If 2 is one of the digits selected, what is the probability that the sum is odd?  
(b) State and prove Baye's theorem.
- 2 (a) If  $X$  denotes the minimum of the two numbers that appear when a pair of fair dice is thrown once. Determine the: (i) Discrete probability distribution.  
(ii) Expectation. (iii) Variance.  
(b) The probability density  $f(x)$  of a continuous random variable is given by  $f(x) = ke^{-|x|}$ ,  $-\infty < x < \infty$ . Find  $k$ , mean and variance of the distribution and also find the probability that the variate lies between 0 and 4.
- 3 (a) Prove that the three successive values of a Poisson variate cannot have equal probability of success.  
(b) Show that the mean deviation from the mean for normal distribution is equal to  $\frac{4}{5}$  times the standard deviation.  
(c) Calculate the mean and S.D of a normal distribution in which 31% are under 45 and 8% are over 64.
- 4 Let  $U_1$  be the variable that stands for any of the elements of the population 2, 7, 9 and  $U_2$  be a variable that stands for any of the elements of the population 3, 8.  
Compute: (i)  $\mu_{U_1}$  (ii)  $\mu_{U_2}$  (iii)  $\mu_{U_1+U_2}$  (iv)  $\mu_{U_1-U_2}$  (v)  $\sigma_{U_1}$  (vi)  $\sigma_{U_2}$  (vii)  $\sigma_{U_1+U_2}$  (viii)  $\sigma_{U_1-U_2}$ . Also verify  $\mu_{U_1-U_2} = \mu_{U_1} - \mu_{U_2}$ .
- 5 (a) Explain briefly the following:  
(i) Point estimation.  
(ii) Interval estimation.  
(b) Define unbiased estimator. Show that  $S^2$  is an unbiased estimator of the parameters  $\sigma^2$ .  
(c) A random sample of size 81 was taken whose variance is 20.25 and mean is 32, construct 98% confidence interval.
- 6 (a) Explain briefly:  
(i) Null hypothesis. (ii) Alternative hypothesis.  
(b) In two large populations, there are 30% and 25% respectively of fair haired people. Is this difference likely to be hidden in samples of 1200 and 900 respectively from the two populations?  
(c) It is claimed that a random sample of 49 tyres has a mean life of 15,200 km. This sample was drawn from a population whose mean is 15,150 kms and a standard deviation of 1200 km. Test at 0.05 L.O.S.

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- 7 (a) A sample of 26 bulbs gives a mean life of 990 hours with a S.D of 20 hours. The manufacturer claims that the mean life of bulbs is 1000 hours. Is the sample not upto the standard?
- (b) From the following data, find whether there is any significant liking in the habit of taking soft drinks among the categories of employees.

Soft drinks	Clerks	Teachers	Officers
Pepsi	10	25	65
Thumsup	15	30	65
Fanta	50	60	30

- 8 (a) It a straight line  $y = a + bx$  to the following data by the method of least squares:

$x$	0	1	3	6	8
$y$	1	3	2	5	4

- (b) Find the correlation coefficient between the heights of 300 adult males in U.S.A as given in the table:

		Heights $x$ (inches)			
		59 - 62	63 - 66	71 - 74	75 - 78
y w e i g h t s	90 - 109	2	1		
	110 - 129	7	8	2	
	130 - 149	5	15	07	01
	150 - 169	2	12	19	05
	170 - 189		7	32	12
	190 - 209		2	20	7
	210 - 229			4	2

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