Roll No..............

BCA-203(O)

B. C. A. (Semester-II) Examination -2014

Paper: III

Mathematical, Foundations in Computer Science-II

Time: Three Hours] [Maximum Marks: 75

Note: Section A compulsory. Attempt any seven questions from Section B and one question from Section C.

Section-A

1. Define the following terms:
   (a) Frequency polygon
   (b) Ogive (4)

2. What is the chance that a leap year selected at random will have 53 Sundays? (4)

3. If $y = ax + b$, then show that
   $\bar{y} = a\bar{x} + b$ and $\sigma_y = a\sigma_x$ (5)

4. If S be the sample space and A be an experiment. Prove that: $P(A) + P(\bar{A}) = 1$. (5)

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14. Two bags contains respectively 3 white, 5 black and 5 white, 3 black balls. One ball is drawn from each bag find the probability that they are white. (6)

Section-C

15. Find the coefficient of skewness in the following distributions. (8+7=15)

Class interval	Frequency
70-80	6
80-90	9
90-100	17
100-110	21
110-120	25
120-130	23
130-140	10
140-150	8

Verify your answer with another formula also.

16. Let X have a probability density function of the form.
$$f(x, \theta) = \begin{cases} \frac{1}{\theta} e^{-x/\theta}; & 0 < x < \infty, \theta > 0 \\ 0; & otherwise \end{cases}$$

To test $H_0: \theta = 2$ against $H_0: \theta = 1$ use a random sample x_1, x_2 of size 2 and define a critical region:
$W_0 = \{(x_1, x_2): 9.5 \leq x_1 + x_2\}$
Find
   (i) Power of the test
   (ii) Significance level of the test (7.5x2=15)

Section-B

5. Find:

   (a) Harmonic mean of 9, 27, 81 (6)

   (b) Geometric mean of 8, 64, 512

6. Find standard deviation of the following data: (6)

x	0	4	5	8	9	13
f	5	6	1	4	7	2

7. Find median from the following data. (6)

Class	Frequency
0-5	29
5-10	195
10-15	241
15-20	117
20-25	52
25-30	10

8. Find the coefficient of correlation between the values x and y: (6)

x	1	2	3	4	5	6	7	8	9
y	9	8	10	12	11	13	14	16	15

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9. The tangent of the angle between the lines of regression of x and y variables is 0.6 and $\sigma_x = \frac{1}{2}\sigma_y$.

   Find r_{xy} (6)

10. Four persons are chosen at random from a group containing 3 men, 2 women and 4 children. Show that the chance that exactly two of them will be children is 10/21. (6)

11. Prove for binomial distribution (6)

$$\mu_{r+1} = pq\left(nr\mu_{r-1} + \frac{d\mu_r}{dp}\right)$$

12. In 120 throws of single dice, the following distribution of faces was obtained. (6)

Faces:	1	2	3	4	5	6	Total
f_0:	30	25	18	10	22	15	120

   Do there results constitute a refutation of the null hypothesis.

   (Given that $\chi^2_{0.05} = 11.070$)

13. Find co-variance between x and y given that at (6)

x:	1	2	3	4	5	6	7	8	9
y:	9	8	10	12	11	13	14	16	15