

**B. N. BANDODKAR COLLEGE OF SCIENCE, THANE**  
 S.Y.B.SC. (INFORMATION TECHNOLOGY) SEMESTER – IV ADDITIONAL EXAMINATION;  
 JUNE 2015  
 COURSE CODE– USIT404

**Duration: 2½ Hrs**

**Total**

**Marks: 75**

**N.B. 1. All questions are compulsory.**

- Q. 1 Answer any two out of following 10**
- a Find the root of the equation  $\sin x - x + 2 = 0$  using false position method
  - b Find the root of the equation  $X^2 + X - 2 = 0$  using bisection method.
  - c Define i) Probability mass function (p.m.f)  
 ii) Cumulative distribution function (c.d.f), of a random variable X.
  - d Explain the terms: i) Type I error ii) Type II error.
- Q. 2 Answer any two out of following 10**
- a Evaluate the integral with  $n=4$  by using Simpson's  $3/8^{\text{th}}$  rule :-  $\int_0^{\pi} (3\cos x + 5) dx$
  - b Use Taylor's series to solve the equation  $\frac{dy}{dx} = X^2 + Y^2$  for  $x=0.25$  and  $x=0.5$  given  $y(0)=1$
  - c Using Gauss Jordan method solve the following equations
 
$$x + 2y - 3z = 2$$

$$6x + 3y - 9z = 6$$

$$7x + 14y - 21z = 13$$
  - d Use Runge –Kutta method to estimate  $y(0.5)$  using  $h=0.25$   $Y' = y + \sin x$   $y(0)=2$
- Q. 3 Answer any two out of following 10**
- a For a binomial variate mean is 3 and  $15P(X=0) = 2P(X=1)$ , find  $P(X=5)$ .
  - b On an average a punch card operator produces 8 erroneous cards per hour. What is the prob. that in sample of cards punched by operator during next one hour would contain 2 or more erroneous cards?
  - c A person receives on an average one missed call per day. Find the probability that he will receive i) no missed calls ii) atleast two missed calls iii) atmost three missed calls on the given day.
  - d Define Exponential variate. Obtain its c.d.f.
- Q. 4 Answer any two out of following 10**
- a A random sample of 40 students has a mean annual earnings of Rs. 3120 and a standard deviation of Rs.677. Construct the 95% confidence interval for the population mean.
  - b Explain how you will the hypothesis  $H_0 P = P_0$  ( $P$  is Population Proportion) against  
 i)  $H_1 P \neq P_0$  ii)  $H_1 P < P_0$  iii)  $H_1 P > P_0$  based on the large sample of size  $n$ .
  - c 20% apples in the consignment are assumed to be bad. If a sample of size 400 apples is

selected what is the probability that sample contains 100 bad apples?

- d** If  $p$  denotes probability of getting head when a coin is tossed. To test the hypothesis  $H_0: p=0.5$  against  $H_1: p=0.75$ , six coins are tossed and  $H_0$  is rejected if more than four heads are obtained. Calculate Probability of Type I error and Probability of Type II error.

**Q. 5** Answer *any two* out of following

**10**

- a** Calculate Karl Pearson's correlation coefficient for the following data.

Age of Husband X	31	38	46	57	42	45	52	39	48	50
Age of wife Y	28	30	42	51	41	39	46	38	42	49

**P.T.O.**

**b** The following are two observations made before(I) and after the treatment (II) on 14 subject.

I : 74 77 74 73 79 76 82 72 75 78 77 78 76 76

II : 70 75 74 70 69 72 76 70 72 72 77 72 71 75

Test the hypothesis whether the treatment was effective to reduce the weights.

**c** Write short note on Correlation Coefficient.

**d** Write down the equations of regression lines. Assuming linear relation between x and y, obtain the most likely value of Y when X=48 from the data given below :-

X	40	46	50	46	55	56	42	47	51	44
Y	49	57	62	58	66	65	20	57	61	55

**Q. 6** Answer any two out of following

10

**a** Explain the applications of Chi-square test.

**b** Write short note on regression lines.

**c** Derive normal equations for fitting a equation the type  $Y = a + bX + cX^2$  for n pairs of values of (x, y)

**d** Calculate Spearman's rank correlation coefficient.

Rank by judge X	1	2	3	4	5	7	6	9	10	8
Rank by judge Y	2	1	4	6	3	5	7	8	9	10

**Q. 7** Answer any three out of following

15

**a** Find  $\sqrt{2.5}$  using the second order Lagrange's interpolation formula.

X	1	2	3	4	5
f(x)= $\sqrt{X}$	1	1.4142	1.7321	2	2.2361

**b** Using the following data test for independence of attributes A & B

	B1	B2
A1	25	44
A2	04	22

**c** In a certain examination out of 200 students, 40 scored more than 75 marks and 18 scored less than 50. Assuming marks follows normal distribution find mean and variance of marks.

**d** Explain the terms: i) Null hypothesis ii) P(Type I error) iii) Power

**e** Explain the principle of least squares.

**f** A poker-dealing machine is supposed to deal cards at random, as if from an infinite deck. In a test, you counted 1600 cards, and observed the following:

Spades	404
Hearts	420
Diamonds	400
Clubs	376

Could it be that the suits are equally likely? Or are these discrepancies too much to be random?

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