

END TERM EXAMINATION

FOURTH SEMESTER [BCA] MAY-JUNE-2013

Paper Code: BCA202(New)

Subject: Mathematics-IV

Time : 3 Hours

Maximum Marks :75

Note: Attempt any five questions including Q.no.1 which is compulsory. Select one question from each unit. Use of scientific calculator is allowed.

Q1 (a) A bag contains 5 red, 6 black and 5 yellow balls. Two balls are drawn at random Find the probability that they both will be black. (2.5x10=25)

(b) Prove that $\binom{n}{r} + \binom{n}{r-1} = \binom{n+1}{r}$.

(c) Evaluate $\Delta^2(e^x)$, where Δ is forward difference operator.

(d) The probability density function of a continuous random variable X is $f(x) = Kx^2, 0 \leq x \leq 1$. Find K.

(e) Show that the coefficient of x^m and x^n in the expansion of $(1+x)^{m+n}$ are equal.

(f) The mean of a Binomial distribution is 3 and its second moment about mean is 2. Find p.

(g) In how many ways 5 pictures can be hung from 7 picture nails on a wall?

(h) If $f(x) = \frac{1}{x^2}$ then find $f(a,b)$, where represents the dividend difference of $(a, f(a))$ and $(b, f(b))$.

(i) Show that the bisection method is linearly convergent.

(j) Compute the mode of a Poisson Distribution having parameter $\lambda = \frac{7}{4}$.

UNIT-I

Q2 (a) A determinant is chosen at random from the set of all determinants of order 2 with elements 0 or 1. Find the probability that the value of determinant chosen is zero. (4.5)

(b) Find the number of non-negative integral solutions of $x_1 + x_2 + x_3 = 20, x_1 \geq 0, x_2 \geq 2, x_3 \geq -1$. (3)

(c) The odds against A solving a certain problem are 8 to 6 and the odds in favour of B solving the same problem are 14 to 10. What is the probability that if both of them try, the problem would be solved? (5)

Q3 (a) Out of $(2n+1)$ tickets consecutively numbered, three are drawn at random. Find the chance that the numbers on them are in A.P. (5)

(b) n letters are to be put into n corresponding envelopes. Find the probability that atleast one of them is put into wrong envelop. (3)

(c) Suppose 8 men out of 100 and 30 women out of 10,000 are colour blind. A colour blind person is chosen at random. What is the probability of his being male? Assume males and females to be in equal number. (4.5)

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UNIT-II

- Q4 (a) David charges Rs.100 for one game in which an unbiased die is rolled on. The player gets Rs.20 if the die shows (1,3,5), Rs.110 if the die shows (2,4) and Rs.150 if its shows (6). What is the expected gain/loss per game for the player? **(6)**
- (b) In a distribution exactly normal 7% of the items are under 35 and 89% are under 63. What are the Standard Deviation and mean of the distribution? It is given that- $P(0 \leq z \leq 1.48) = 0.4300$, $P(0 \leq z \leq 0.18) = 0.0700$, $P(0 \leq z \leq 1.23) = 0.3900$. **(6.5)**

- Q5 (a) An experiment succeeds twice as often as it fails. If the experiment is performed 6 times then find the probability of atleast 4 successes. **(6)**
- (b) If X is a Poisson Variate such that $P(X = 2) = 9P(X = 4) + 90P(X = 6)$: Find (i) λ (ii) the mean of X. **(6.5)**

UNIT-III

- Q6 (a) Find the form of the function given by **(5)**
- | | | | | |
|---|---|----|----|-----|
| x | 3 | 2 | 1 | -1 |
| f | 3 | 12 | 15 | -21 |
- (b) Find a real root of the equation $3x = \cos x + 1$. Use Newton-Raphson Method. **(7.5)**

- Q7 (a) From the following data, estimate the number of persons having income between (1700-1800):- **(6.5)**

Income	Below 500	500-1000	1000-2000	2000-3000	3000-4000
No. of persons	6000	4250	3600	1500	650

- (b) Find a real root of the equation $x^3 - x - 11 = 0$, correct to four decimals. Use Bisection method carry upto 7 iterations. **(6)**

UNIT-IV

- Q8 (a) Express $A=LU$ where $A = \begin{pmatrix} 2 & 3 & 1 \\ 1 & 2 & 3 \\ 3 & 1 & 2 \end{pmatrix}$ using factorization method. **(6.5)**

- (b) The table below reveals velocity V of body during time 't' specified. Find its acceleration at $t=1.1$. **(6)**

t	1.0	1.1	1.2	1.3	1.4
v	43.1	47.7	52.1	56.4	60.8

- Q9 (a) Apply Gauss-Seidal method to solve $15x + y + z = 15$, $x + 20y - 3z = 18$, $2x + 3y + 10z = 15$. **(6.5)**

- (b) Evaluation $\int_0^4 e^x dx$ by Simpson's Rule, given that $e=2.72$, $e^2=7.39$, $e^3=20.09$, $e^4=54.6$ and compare it with actual value. **(6)**

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