END TERM EXAMINATION

FOURTH SEMESTER [BCA] MAY- JUNE 2015

Paper Code: BCA-202   **Subject: Mathematics IV**
                                           (Batch: 2011 onwards)

Time: 3 Hours   **Maximum Marks: 75**

> Note: Attempt any five questions including Q.1 which is compulsory.
> Select one question from each unit.

Q1 (a) Evaluate $\Delta^n \left[e^x \right]$ **(2.5X10=25)**

(b) Find the value of r if $^{18}C_r = {}^{18}C_{r+2}$

(c) What is the chance that a leap year selected at random will contain 53 Sundays?

(d) In how many ways can 8 persons be seated at a round table? In how many cases will 2 particular persons sit together?

(e) In 256 sets of 12 tosses of a coin, in how many cases one can except 8 heads and 4 tails.

(f) Find the Variance of Position Distribution if $2P(x=1)=P(x=2)$.

(g) If $f(x)=kx^3, 0<x<1$ and 0 elsewhere, is a p.d.f. then find the value of k.

(h) If X is a binomial variate with $p=1/5$, for the experiment of 50 trials then find the standard deviation of the distribution.

(i) Show that $\Delta^3 y_2 = \nabla^3 y_5$

(j) Find $\Delta^2 \left[\dfrac{1}{x(x+3)(x+6)} \right]$

UNIT-I

Q2 (a) If A, B, C are events such that   **(4)**
$(P(A)=0.3, \qquad P(B)=0.4, \qquad P(C)=0.8, \qquad P(A \cap B)=0.08$
$P(A \cap C) = 0.28, \quad P(A \cap B \cap C) = 0.09$. If $P(A \cup B \cup C) \geq 0.75$,
Then show that $0.23 \leq P(B \cap C) \leq 0.48$

(b) Two urns contain 4 white, 6 blue and 4 white, 5 blue balls respectively. One of the urns is selected at random at a ball is drawn from it. If the ball drawn is white, find the probability that it is drawn from the:
  (i) First urn   (ii) Second urn   **(4)**

(c) For a normal distribution with mean 2 and variance 9, find the value of x of the variate such that the probability of the variate lying in the interval (2,x) is 0.4115.   **(4.5)**

Q3 (a) Find the number of ways of dividing a set of size n into two disjoint subsets of sizes r and n-r.   **(4)**

(b) Solve each equation, where $n \geq =0$ **(4)**
  (i) $C(n, 0) =1$ (ii) $C(n,1) =10$
  (iii) $C(n, 2)=28$ (iv) $C(n, n-2)=55$

(c) A random variable X for hitting the target takes the values $0,1,2,3\ldots\ldots$ with probability proportional to $k(x+1)(1/5)^x$. Find $P(X \leq 5)$. **(4.5)**

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UNIT-II

Q4 (a) The probability that a man aged 60 will live to be 70 is 0.65. What is the probability that out of 10 men, now 60, at least 7 will leave to be 70? **(6)**

(b) x is a continuous random variable with probability density function given by $f(x) = \begin{cases} kx, & (0 \le x < 2) \\ 2k, & (2 \le x \le 4) \\ -kx+6k, & (4 \le x \le 6) \end{cases}$ find k and mean value of X **(6.5)**

Q5 (a) If x is a Poisson variate such that $P(x=2)=9P(x=4)+90 P(x=6)$. Find the standard deviation. **(6)**

(b) The proofs of a 500 page book contains 500 mistakes. Find the probability that there are at least four mistakes per page. **(6.5)**

UNIT-III

Q6 (a) Find by Newton's method, the real root of the equation $3x = \cos(x)+1$. **(6)**

(b) From the following table, estimate the number of students who obtained marks in between 40 and 45: **(6.5)**

Marks	30-40	40-50	50-60	60-70	70-80
No. of students	31	42	51	35	31

Q7 (a) Find a real root of $2x - \log_{10} x = 7$ using Bisection Method. **(6)**

(b) Determine f(x) as a polynomial in x for the following data: **(6.5)**

x	-4	-1	0	2	5
f(x)	1245	33	5	9	1335

UNIT-IV

Q8 (a) Apply Gauss Jordan method to solve the equations AX=B where **(6.5)**

$$A = \begin{vmatrix} 1 & 1 & 1 \\ 2 & -3 & 4 \\ 3 & 4 & 5 \end{vmatrix}, X = \begin{bmatrix} x \\ y \\ z \end{bmatrix}, B = \begin{bmatrix} 9 \\ 13 \\ 40 \end{bmatrix},$$

(b) The velocity v of a particle at a distance s from a point on its path is given by the following table: **(6)**

S(ft)	0	10	20	30	40	50	60
V(ft/s)	47	58	64	65	61	52	38

Estimate the time taken to travel 60 ft using Simpson's 1/3 rule.

Q9 (a) Factorize the matrix $\begin{pmatrix} 2 & -3 & 10 \\ -1 & 4 & 2 \\ 5 & 2 & 1 \end{pmatrix}$ using LU decomposition. **(6.5)**

(b) The population of a certain town is shown in the following data: **(6)**

Year	1951	1961	1971	1981	1991
Population (in thousands)	19.96	36.65	58.81	77.21	94.61

Find the rate of growth of the population in the year 1981.

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