

# 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  $\Delta^n [e^x]$  (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 expect 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  $\Delta^2 \left[ \frac{1}{x(x+3)(x+6)} \right]$

### UNIT-I

- Q2 (a) If A, B, C are events such that (4)  
 $P(A)=0.3, P(B)=0.4, P(C)=0.8, P(A \cap B)=0.08$   
 $P(A \cap C)=0.28, P(A \cap B \cap C)=0.09$ . 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.....with probability proportional to  $k(x+1)(1/5)^x$ . Find  $P(X \leq 5)$ . (4.5)

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P.1/2

**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

$$\text{given by } f(x) = \begin{cases} kx, & (0 \leq x < 2) \\ 2k, & (2 \leq x \leq 4) \\ -kx + 6k, & (4 \leq x \leq 6) \end{cases}$$

find  $k$  and mean value of  $X$  **(6.5)**

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

<b>Marks</b>	30-40	40-50	50-60	60-70	70-80
<b>No. of students</b>	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)**

<b>x</b>	-4	-1	0	2	5
<b>f(x)</b>	1245	33	5	9	1335

**UNIT-IV**

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

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

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

<b>S(ft)</b>	0	10	20	30	40	50	60
<b>V(ft/s)</b>	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)**

<b>Year</b>	1951	1961	1971	1981	1991
<b>Population (in thousands)</b>	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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