(Please write your Exam. Roll No.) *Exam. Roll No.* 084.....

END TERM EXAMINATION

FOURTH SEMESTER [BCA], MAY – 2011

Paper Code : BCA 202	*Subject : Mathematics-IV*
Paper Id : 20202	

Time : 3 Hours *Maximum Marks : 75*

Note : Q.No.1 is compulsory. Attempt One question from each unit.

Q. 1 (a) An urn contains 10 black and 10 white balls. Two balls are drawn from it. Find the probability that the two balls are of the same colour. **(10×2.5=25)**

(b) Find n if $P(n, 4) = 42\, P(n, 2)$.

(c) Let Δ and ∇ denote respectively the first forward and first backward difference operators. Prove that $\Delta\nabla = \Delta - \nabla$.

(d) Suppose X is a Poisson variate. If $P(X=1) = 2\, P(X=2)$, find $P(X=0)$.

(e) The two regression coefficients are – 0.1 and – 0.9. Find r, the coefficient of correlation.

(f) Find the probability of getting 4 heads in 6 tosses of an unbiased coin.

(g) In how many ways can 6 boys be arranged along the boundary of a circle.

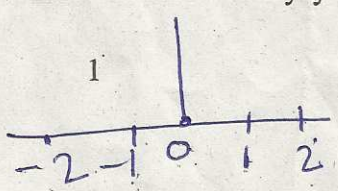
(h) Construct forward difference table from the values of x and y given below

x	0	1	2	3	4	5
y	5	11	22	18	27	2

From the table, write the values of $\Delta^2 y_3$, $\Delta^3 y_2$ and $\Delta^4 y_1$.

(i) Evaluate $\int_{-2}^{2} x^3 dx$, using Trapezoidal rule, by dividing the closed interval [– 2, 2] into 4 equal parts.

(j) Consider a binomial distribution with parameters n=8 and $p = \frac{1}{2}$. Is this binomial distribution bimodal? Justify your answer.



P.T.O.

UNIT-I

Q. 2. (a) Find the probability of getting the sum 10 in one throw with three dice. **(6)**

(b) If A and B are independent events and $P(A) = P(B/A) = \frac{1}{2}$, find $P(A \cup B)$. **(6.5)**

Q. 3. (a) Out of (2n+1) tickets consecutively numbered, three tickets are drawn at random. Find the probability that the numbers on these three tickets form an arithmetic progression. **(6.5)**

(b) An urn A contains 'a' white and 'b' black balls. Another urn B contains 'c' white and 'd' black balls. One ball is transferred from the urn A into the urn B and then a ball is drawn from the urn B. Assuming that the ball drawn is white, find the probability that the transferred ball was also white. **(6)**

UNIT-II

Q. 4. (a) Find the constant c for which ce^{-2x^2+x}, $-\infty < x < \infty$, is a normal density function of a real-valued continuous random variable. **(6)**

(b) Given the lines of regression
$2x - 9y + 6 = 0$ and $x - 2y + 1 = 0$,
determine the means $\bar{x}, \bar{y}$ and the regression coefficients b_{xy}, b_{yx}.
Also, find the coefficient of correlation between x and y. **(6.5)**

Q. 5. (a) The data given below indicate the marks obtained out of 30 in the written tests conducted in Statistics and Economics. Compute Spearman's rank correlation coefficient :

Students	Marks in Statistics (x)	Marks in Mathematics (y)
A	20	18
B	18	16
C	26	29
D	15	27
E	17	12

(6)

(b) Define the Karl Pearson Coefficient of correlation between the variates X and Y. Compute it from the data given below :
$\text{Cov}(X, Y) = 15.4,\ \sigma_x = 6,\ \sigma_y = 7$ **(3.5)**

(c) Suppose X is a normal variate with mean $\mu = 0$ and variance $\sigma_x^2 = 1$. Find E(|X|), the expected value of the variate |X|. **(3)**

UNIT-III

Q. 6. (a) By using Newton's forward interpolation formula, find the cubic polynomial which can be fitted by using the following data :

x	0	1	2	3
f(x)	1	2	1	10

(5)

(b) By using Bijection method, find a positive root of the equation $x e^x - 1 = 0$, correct to three decimal places, using the fact that f(0) and f (1) and of opposite signs where $f(x) = x e^x - 1$. **(7.5)**

Q. 7. (a) Given $\sqrt{5} = 2.236,\ \sqrt{6} = 2.449,\ \sqrt{7} = 2.646$ and $\sqrt{8} = 2.828$, find the value of $\sqrt{5.5}$ by using Newton's forward interpolation formula. **(6)**

(b) By using Newton-Raphson method, find a positive root of the equation $x e^x - 1 = 0$. Use the fact that f(0) and f(1) are of opposite signs where $f(x) = x e^x - 1$. Start with $x_0 = 0.5$ and perform only two iterations. **(6.5)**

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UNIT-IV

Q. 8. (a) Find the $\lfloor U$ decomposition of the matrix $A = \begin{pmatrix} 2 & 3 & 1 \\ 1 & 2 & 3 \\ 3 & 1 & 2 \end{pmatrix}$ **(6)**

(b) By using Gauss elimination method, slove the following system of linear equations :

$$6x - y - z = 19$$
$$3x + 4y + z = 26$$
$$x + 2y + 6z = 22$$ **(6.5)**

Q. 9. (a) By using Gauss-Jordan method, solve the following system of linear equations :

$$2x + y + z = 10$$
$$3x + 2y + 3z = 18$$
$$x + 4y + 9z = 16$$ **(6)**

(b) Determine the actual value of the integral $\int_0^1 \frac{1}{1+x^2} dx$. Also, evaluate this integral, using Simpson's $\frac{1}{3}$rd rule, by dividing the interval [0, 1] into four equal parts. Compare the two values, so obtained, of the integral under consideration, and find an approximate value of π. **(6.5)**

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