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J-1375[6373 A] [2957]

BBA (Semester - 1st)

BUSINESS MATHEMATICS (BB - 102)

Time : 03 Hours **Maximum Marks : 60**

Instruction to Candidates:

1) Section - A is **compulsory**

2) Attempt any **Four** questions from Section - B.

Section - A *(10 x 2 = 20)*

Q1)

a) Two finite sets have x and y number of elements. The total number of subsets of the first set is four times the total number of subsets of the second set. Find the value of $x - y$.

b) Determine whether the proposition $[p \wedge (p \rightarrow q)] \rightarrow q$ is a tautology.

c) How many committees of five people can be chosen from 20 men and 12 women if at least four women must be on each committee?

d) Expand $(3x^2 + 2y)^5$ using the Binomial Theorem.

e) Evaluate $\lim_{x \to 4} \dfrac{x^2 - 7x + 12}{x^2 - 3x - 4}$.

f) Find the domain and range of $f(x) = \sqrt{9 - x^2}$

g) Express the matrix $A = \begin{bmatrix} 2 & 1 & 3 \\ 1 & 1 & 4 \\ -1 & 6 & 2 \end{bmatrix}$ as the sum of symmetric and a skew - symmetric matrix.

h) Does the following system of equations have a solution? Is it unique? Give reasons.

$$4x + 2y = 10$$
$$2x + y = 5.$$

P.T.O.

i) What will be the interest on Rs. 1,500 after 1 year if interest is compounded quarterly at 9%.

j) If office furniture purchased on January 5 for Rs. 7,500 has an estimated useful life of 6 years and a trade - in value Rs. 650, what is the book value at the end of the fifth year?

Section - B

(4 x 10 = 40)

Q2) Define the converse, inverse and contrapositive of a statement. By writing the following argument in symbolic form, determine its validity:

If Ruchi gets the supervisor's position and works hard, then she will get a raise.

If she gets the raise, then she will buy a new car.

She has not purchased a new car.

Therefore either Ruchi did not get the supervisor's position or she did not work hard.

Q3) In how many ways can 6 students out of a class of 12 be chosen to attend class on a late Thursday afternoon (and take notes for others) if

(a) Pawan refuses to go to class?

(b) Mohan insists on going?

(c) Jimmi and Mohan insist on going?

(d) Just one of Jimmi and Mohan attend?

(e) Pawan and Mohan refuse to attend class together?

Q4) If $f(x)=\begin{cases} 1, & \text{if } x\leq 3 \\ ax+b & \text{if } 3<x<5 \\ 7, & \text{if } 5\geq x \end{cases}$. Determine the values of a and b so that $f(x)$ is continuous. Also discuss the differentiability $g(x)=|x-1|+|x-2|$ graphically.

Q5) Define an increasing and decreasing function. Write the criteria of testing the increasing and decreasing function. Find all the points of local maxima and minima of the function as well as the corresponding maximum and minimum value for the function $f(x)=x^3-6x^2+9x-8$.

Q6) Describe the Cramer's Rule for solving the system of simultaneous linear equations and hence solve the following system of linear equations:

$3x+y+2z=3,\ \ 2x-3y-z=-3,\ x+2y+z=4.$

Q7) Using the double declining balance method of depreciation, calculate the book value to the nearest rupee at the end of the second year for the following:

(a)	Cost	Rs.120,000
	Trade - in value	Rs.5,700
	Estimated life	25yr
	Purchased	May 3
(b)	Cost	Rs.3,000
	Trade - in value	Rs.0
	Estimated life	8yr
	Purchased	August 16

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