SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
B.Com.(Hons) - END SEMESTER EXAMINATIONS NOVEMBER - 2023
SEMESTER - III
20UBHCT3009 - Business Mathematics

Total Duration : 2 Hrs. 30 Mins. Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. The ratio of the prices of two houses was 16 : 23. Two years later, when their prices of the first has risen by 10% and that of the second by Rs.477, the ratio of their prices becomes 11 : 20. Find the original prices of the two houses.
2. Given $f(x) = x+3, g(x) = 2x+7$ and $h(x) = x^2$, show that$(fog)oh$=$fo(goh)$
3. A man repays a loan of Rs.3,250 by paying Rs.20 in the first month and then increases the payment by Rs.15 every month. Compute how long will it take to clear this loan?
4. Differentiate with respect to x:
   $\sqrt[4]{\dfrac{x^3(2x^2-3)}{(1-2x)^2}}$
5. A $= \begin{pmatrix} 2 & 2 & 5 \\ 5 & 3 & -1 \end{pmatrix}$ and B $= \begin{pmatrix} 4 & 7 \\ 2 & 5 \\ 3 & -2 \end{pmatrix}$
   show that $(AB)^T = B^T A^T$.
6. Out of 4 offices and 10 clerks in an office, a committee consisting of 2 offices and 3 clerks in to be formed. Compute in how many ways can this be done if (i) any officer and any clerk can be included (ii) one particular clerk must be on the committee.
7. If a + b : $\sqrt{ab}$ = 4 : 1,
   show that a : b = 2 + $\sqrt{3}$: 2 - $\sqrt{3}$.
8. A man wishes to have Rs.2,500 available in a bank account when his daughter's first year college expenses begin. Examine the amount he must deposit in the beginning of each year at 3.5% compounded annually, if the girl is to start in college six years from now?

Contd...

Section C

I - Answer any **TWO** questions $(2 \times 10 = 20$ Marks)

9. Out of 880 boys in a school, 224 played Cricket, 240 played Hockey and 336 played Basketball. Of the total 64 played both basketball and hockey, 80 played cricket and basketball and 40 played cricket and hockey. 24 played all the three games. Prepare a Venn diagram and compute how many did not play any of the games, and how many played only one game?

10. The value of diamond varies as the square of its weight. A diamond is broken into 5 pieces, the weights of which are in the ratio 1 : 2 : 3 : 4 : 5. If the resulting loss be Rs.85,000, compute the value of the original diamond. Also calculate the value of a diamond whose weight is twice that of the original diamond.

11. Determine the sum to infinity of the series
$\frac{1}{1.2.3} + \frac{1}{3.4.5} + \frac{1}{5.6.7} + ...\infty$

12. The total profit y in rupees of a drug company from the manufacture and sale of x drug bottles is given by
$y = -\frac{x^2}{400} + 2x - 80.$
Examine the following:
    (i) How many drug bottles must the company sell to achieve the maximum profit?
    (ii) What is the profit per drug bottle when this maximum is achieved?

II - Compulsory question $(1 \times 10 = 10$ Marks)

13. Given two matrices A and B where
$\mathrm{A} = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$ & $\mathrm{B} = \begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{bmatrix}$
Verify that $\mathrm{AB} = \mathrm{BA} = 6I$. Using this result solve the set of equations.
$x - y = 3; 2x + 3y + 4z = 17;$ and $y + 2z = 7.$

******