

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.(Honours) - END SEMESTER EXAMINATIONS NOVEMBER - 2022

SEMESTER - III

20UBHCT3009 - Business Mathematics

Total Duration : 2 Hrs 30 Mins.

Total Marks : 60

**Section A**

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

- Let the functions  $f$  and  $g$  on the real numbers be defined by  $f(x) = x^2 + 2x - 3$ ,  $g(x) = 3x - 4$ .  
Find  $f \circ g$  and  $g \circ f$ .
- Eighteen liters are drawn from a vessel full of wine. It is then filled with water. Then eighteen liters of the mixture are drawn and the quantity of wine to that of water in it is 16:9, show how much does the vessel hold?
- If  $a : b = c : d$ , prove that  $ab + cd$  will be the mean proportion between  $a^2 + c^2$  and  $b^2 + d^2$ .
- The sequence of three numbers  $a, b, c$  are in A.P. whose sum is 18. If  $a$  and  $b$  are each increased by 4 and  $c$  is increased by 36, the new number form a G.P. Find  $a, b, c$ .
- Prove that  $\log(1 + 3x + 2x^2) = 3x - \frac{5x^2}{2} + \frac{9x^3}{3} - \frac{17x^4}{4} + \dots$
- Differentiate the following with respect to  $x$ . (a)  $(4x-3)^5$  (b)  $\sin(\log x)$
- Find the maximum and minimum values of the function  $x^5 - 5x^4 + 5x^3 - 1$ .
- A bill for Rs.3,650 was drawn on 22<sup>nd</sup> January at 6 months date and discounted on 16<sup>th</sup> April at the rate of 10% per annum. Find the sum for which the bill was discounted and the banker's gain.

**Section B**

**Part A**

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

- In a survey of 1000 customers the number of people that buy the various grades of coffee seeds were found to be as follows:

'A' Grade only	180
'A' grade and 'C' grade	80
'C' grade	480
'A' grade but not 'B' grade	230
'A' grade	260
'C' grade and 'B' grade	80
None of the three grades	240

Contd...

- (a) How many buy 'B' grade coffee seeds only.  
 (b) How many buys 'C' grade if and only if they do not buy 'B' grade.  
 (c) How many buy both 'C' and 'B' grades but not the 'A' grade.
10. Given that  $p(y + z) = q(z + x) = r(x + y)$ , obtain the value of  $\frac{x}{y}$
11. From 5 Economists, 4 Accountants and 3 Mathematicians, form a committee of 6 to be chosen so that  
 (a) 2 Economists, 2 Accountants and one Mathematician are included  
 (b) 2 members of the committee are Mathematicians  
 (c) Atleast 3 members of the committee are Economists
12. The cost function for producing X units of a product is  $c(x) = x^3 - 12x^2 + 48x + 11$  (in rupees) and the revenue function  $R = 83x - 4x^2 - 21$ . Find the output for which profit is maximum.

### Part B

Compulsory question  $(1 \times 10 = 10 \text{ Marks})$

13. Verify that  $AA^{-1} = A^{-1}A = I$  for the matrix  $\begin{pmatrix} 2 & 4 & -1 \\ 3 & 1 & 2 \\ 1 & 3 & -3 \end{pmatrix}$

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