

**BBA (H) Semester II Examinations, 2022**

**Subject: Business Mathematics**

**Paper: BBA-2.3**

**Time: 4 Hours**

**Full Marks: 80**

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

**Answer Q. 1 and any five from the rest.**

**1. Answer any ten questions:**

**2×10 = 20**

- (a) If  $x = 3^{2/3} + 3^{-2/3}$ , show that  $9x^3 - 27x = 82$
- (b) Find the sum of first 11 terms of a G.P., given by  $1, -\frac{1}{2}, \frac{1}{4}, -\frac{1}{8}, \dots, \dots$
- (c) Define 'Arithmetical Progression'.
- (d) How many terms of the following series may be taken so that their sum is 66?  
 $-9, -6, 3, \dots$
- (e) What is meant by a quadratic equation?
- (f) Solve  $5^x + 5^{2-x} = 26$ .
- (g) The logarithm of a number is 5.673. Find the characteristic and mantissa.
- (h) Define 'Permutation'.
- (i) Find the middle term in the expansion of  $(x+y)^{13}$ .
- (j) A committee consisting of 5 members is to be formed out of 6 men and 4 women. How many committees can be formed so that at least one woman is always there in the committee?
- (k) Solve the equation  
 $\log_{10}(x-14) + \log_{10}(x-5) = 1$
- (l) Find the distance between the points  $(4, -7)$  and  $(-1, 5)$ .
- (m) With an example, define a Diagonal Matrix.
- (n) What is meant by equality of matrices?
- (o) Find out the limit of  $\frac{x^2-1}{x-1}$  as  $x \rightarrow 1$ .
2. (a) Insert 6 arithmetic means between 1 and 19.
- (b) If  $\frac{1}{b+c}, \frac{1}{c+a}, \frac{1}{a+b}$  are in A.P., prove that  $a^2, b^2, c^2$  are also in A.P. 7+5=12
3. (a) The sum of three numbers in G.P. is 35 and their product is 1000. Find the numbers.
- (b) If S is the sum, P the product and R the sum of reciprocals of n terms in G.P., prove that  
 $P^2R^n = S^n$  5+7=12
4. (a) Evaluate the fourth root of  $56 - 24\sqrt{5}$ .
- (b) If  $a^x = \left(\frac{a}{k}\right)^y = k^m$  and  $a \neq 1$ , prove that  
 $\frac{1}{x} - \frac{1}{y} = \frac{1}{m}$  6+6=12
5. (a) List out the properties of logarithms.
- (b) If  $\log_a m = n$ , show that  
 $\log_{1/a} m = -n$ . Hence find  $\log_{1/a} 27\sqrt{3}$ . 6+6=12

**P.T.O.**

6. (a) In how many ways, a party of 4 or more can be selected from 10 persons?  
(b) The letters of the word ZENITH are written in all possible orders. How many words are possible? If all these words are written as in dictionary, what is the rank of word ZENITH? 4+8=12
7. (a) Show that the medians of a triangle are concurrent.  
(b) Find the intercept that the line  $3x - 2y - 6 = 0$  makes on the axes. What is the slope of this line? 6+6=12
8. (a) If  $A = \begin{pmatrix} 0 & 1 & 2 \\ 2 & 3 & 4 \\ 4 & 5 & 6 \end{pmatrix}$  and  $k_1 = 1, k_2 = 2$ , verify  $(k_1 + k_2)A = k_1A + k_2A$ .  
(b) Solve the system of equations  
$$\begin{aligned} x + y + z &= 7 \\ x + 2y + 3z &= 16 \\ x + 3y + 4z &= 22. \end{aligned}$$
6+6=12
9. (a) If the roots of  $ax^2 + bx + c = 0$  are in the ratio  $p : q$ , prove that  $ac(p+q)^2 = b^2pq$   
(b) Explain the nature of roots of the quadratic equation  $ax^2 + bx + c = 0$  in cases when the discriminant is (i)  $>0$ , (ii)  $= 0$ , and (iii)  $<0$ . 6+6=12
10. (a) Show that for  $y = |x|$ ,  $\frac{dy}{dx}$  does not exist at  $x=0$ .  
(b) The side of an equilateral triangle is increasing at the rate of 2 cm/sec. At what rate is its area increasing when the side is 20 cms.? 7+5=12

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