

## U.G. 2nd Semester Examination - 2022

### B.B.A.

[HONOURS]

Course Code : BBBACCHT 202

Course Title: Business Mathematics

Full Marks : 40

Time : 2 Hours

*The figures in the right-hand margin indicate marks.*

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

1. Answer any **ten** questions of the following:

$$1 \times 10 = 10$$

- a) In a G.P. 1st term is 3 and common ratio is 2.  
Find the 6th term.

b) Find the value of  $\begin{vmatrix} 10 & 20 & 30 \\ 3 & 4 & 7 \\ 1 & 2 & 3 \end{vmatrix}$ .

- c) The pth term of an A.P. is  $2p+3$ . Find the 1st term and common difference.

d) Evaluate :  $\lim_{x \rightarrow 2} \frac{x^5 - 2^5}{x - 2}$

- e) If  $y = x e^x$ , find  $\frac{dy}{dx}$

f) If  $A = \begin{bmatrix} 1 & 7 & 5 \\ 2 & 6 & 4 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 4 & 3 \\ 0 & 5 & 2 \end{bmatrix}$ , find  $A-B$ .

g) Evaluate :  $\int_{-1}^1 x e^{+x^2} dx$

h) Evaluate :  ${}^7C_2 + {}^5P_3$

i) Find  $\begin{bmatrix} 1 & 2 & 3 \end{bmatrix} \times \begin{bmatrix} 4 \\ 0 \\ -1 \end{bmatrix}$ .

j) If  $(\sqrt{7})^{2x} = 343$ , find the value of x.

- k) In how many distinct ways can the letters of the word MILKY be arranged?

l) If  $A = \begin{pmatrix} 1 \\ 4 \\ 0 \end{pmatrix}$  and  $B = (3 \ 0 \ -4)$ , find  $AB$ .

- m) Find the distance of the point (3,4) from the origin.

n) Evaluate :  $\lim_{x \rightarrow 0} \frac{e^{4x} - 1}{x}$ .

- o) Find the equation of the straight line parallel to x-axis and which is at distance 3 unit from the origin.

2. Answer any **five** questions of the following:

$$2 \times 5 = 10$$

a) Find the value of  $\frac{d}{dx}(x^2 \sin x)$

b) Find the minor and cofactor of 3 in  $\begin{vmatrix} 2 & -1 & -3 \\ 0 & -2 & 1 \\ 3 & 4 & 5 \end{vmatrix}$

c) Evaluate :  $\int_1^2 \left( x + \frac{1}{x} \right) dx$ .

d) The sum of three numbers in A.P. is 15 and their product is 45. Find the numbers.

e) Find the area of the triangle whose vertices are  $(-1,1)$ ,  $(2,3)$  and  $(4,5)$ .

f) Evaluate :  $\left\{ 729^{-\frac{2}{3}} \times 3^4 \right\}^{-\frac{5}{6}}$ .

g) If  $\log x = a$ ,  $\log y = b$  and  $\log z = -(a+b)$ , prove that  $xyz=1$ .

h) The n-th term of a G.P. is given by  $t_n = 3^n$ . Find the common ratio of the G.P.

3. Answer any **two** questions of the following:

$$5 \times 2 = 10$$

a) Prove that

$$\begin{vmatrix} 1+x & 1 & 1 \\ 1 & 1+y & 1 \\ 1 & 1 & 1+z \end{vmatrix} = xyz \left( 1 + \frac{1}{x} + \frac{1}{y} + \frac{1}{z} \right).$$

b) Prove that  $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\tan x}}{\sqrt{\tan x} + \sqrt{\cot x}} dx = \frac{\pi}{4}$

c) Solve :  $\log_{10} x - 1 = -\log_{10} (x-9)$ .

4. Answer any **one** question :  $10 \times 1 = 10$

a) i) Prove that  $A^2 - 4A - 5I = 0$ , where

$$A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}. \text{ Hence find } A^{-1}.$$

ii) If  $\log_a^{bc} = x$ ,  $\log_b^{ca} = y$ ,  $\log_c^{ab} = z$ , prove

$$\text{that } \frac{1}{x+1} + \frac{1}{y+1} + \frac{1}{z+1} = 1. \quad 5+5$$

b) i) Find the value of  $4+44+444+\dots$  up to n terms.

ii) If  $\frac{1}{b+c}$ ,  $\frac{1}{c+a}$ ,  $\frac{1}{a+b}$  are in A.P. then show that  $a^2, b^2, c^2$  are in A.P.

iii) If  ${}^nC_{r-1} = 36$ ,  ${}^nC_r = 84$  and  ${}^nC_{r+1} = 126$   
then find the value of n and r.

c) i) If  $x^m y^n = (x+y)^{m+n}$ , show that  $\frac{dy}{dx} = \frac{y}{x}$ .

ii) Solve by Cramer's rule :

$$x + y + z = 3, 2x - y - z = 0, x + 3y - 4z = 7.$$

5+5

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