

U.G. 2nd Semester Examination - 2021

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:

1×10=10

- If $(27)^x = (81)^y$ then find x:y.
- If $\log_{10}(7x - 5) = 2$; then find the value of x.
- Evaluate : ${}^{15}C_8 + {}^{15}C_9$
- In how many ways can letters of the word 'ALGEBRA' be arranged?
- Find the coordinates of the middle point of the line joining the points $(a-b, a+b)$ and $(a+b, b-a)$.
- Find the equation of the straight line perpendicular to $2x+3y=5$ and passing through $(-1,2)$.

[Turn Over]

g) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 4 \\ 5 & 1 \end{bmatrix}$ find A.B.

h) Find the value of the determinant (without expanding)

$$\begin{vmatrix} 100 & 101 & 102 \\ 103 & 104 & 105 \\ 106 & 107 & 108 \end{vmatrix}$$

- Find the number of distinct permutation in which the letters of 'assumption' can be arranged.
- If a G.P. has its first term 2, and common ratio 2, find its 6-th term.
- Find the distance between the points $(1,2)$ and $(1,-2)$.

l) Evaluate: $\int_0^1 xe^x dx$.

m) Find the value of $\lim_{x \rightarrow 0} \frac{6^x - 1}{x}$.

n) Find the equation of the line parallel to y-axis and passing through the point $(0,0)$.

o) Find the value of the determinant $\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix}$

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

2×5=10

a) If $a = b^c$, $b = c^a$ and $c = a^b$ then show that $abc=1$.

- b) Prove that $(\log x)^2 - (\log y)^2 = \log(xy) \log\left(\frac{x}{y}\right)$.
- c) The sum of three numbers in G.P. is 35 and their product is 1000. Find the numbers.
- d) If the points (a,0), (0,b) and (1,1) are collinear, then show that $\frac{1}{a} + \frac{1}{b} = 1$.
- e) Evaluate : $\int_1^3 (2x^2 + 5) dx$
- f) Evaluate : $\int_1^2 \left(x + \frac{1}{x}\right) dx$
- g) Find the area of the region bounded by the co-ordinate axes and the line $x+y=1$.

h) Find the rank of the matrix $\begin{pmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ -3 & 2 & 0 \end{pmatrix}$

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

$$5 \times 2 = 10$$

- a) If $x^m \cdot y^n = (x+y)^{m+n}$, Prove that $\frac{dy}{dx} = \frac{y}{x}$.
- b) The sum and product of three numbers which are in A. P. are respectively 30 and 750. Find the numbers.

c) Find the inverse of the matrix $\begin{pmatrix} 1 & -1 & 0 \\ -1 & 0 & 1 \\ 0 & 1 & -1 \end{pmatrix}$.

4. Answer any **one** question of the following:

$$10 \times 1 = 10$$

- a) i) If $\log\left(\frac{x+y}{5}\right) = \frac{1}{2}(\log x + \log y)$ then show that $\frac{x}{y} + \frac{y}{x} = 23$.

ii) If ${}^n P_4 = 12 \times {}^n P_2$, find n.

iii) Find $\int \frac{xe^x}{(x+1)^2} dx$ 4+3+3

b) i) Show that

$$\frac{1}{1+x^{a-b}+x^{a-c}} + \frac{1}{1+x^{b-c}+x^{b-a}} + \frac{1}{1+x^{c-a}+x^{c-b}} = 1$$

ii) If $x^y = e^{x-y}$, prove that $\frac{dy}{dx} = \frac{\log e^x}{(\log_e ex)^2}$.

iii) If $A = \begin{bmatrix} 2 & -1 \\ 1 & 2 \end{bmatrix}$, find A^{-1} . 3+4+3

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

ii) Solve by Cramer's rule :

$$2x + y + z = 5, x - y = 0, 2x + y - z = 1$$

$$5+5$$