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47 (Sem-1) BUMA 1-3

2018

BUSINESS MATHEMATICS

Paper : 1-3

Full Marks : 80

Time : Three hours

Answer Question No's 1 & 2 and **any five** from the **rest**.

1. Choose the correct alternative: $1 \times 10 = 10$

(a) The characteristics of logarithm of the number 375.67 is

(i) 1

(ii) 2

(iii) 0

~~(iv) 3~~

(b) In an LPP

(i) only the objective function is linear

(ii) only the constraints are linear

(iii) the objective function as well as the constraints are linear

(iv) none of the above

(c) If two rows or columns of a determinant are identical the value of the determinant becomes

(i) 0

(ii) 1

(iii) 2

~~(iv) can't say~~

(d) $\log\left(\frac{a}{b}\right) + \log\left(\frac{b}{c}\right) + \log\left(\frac{c}{a}\right) = ?$

(i) 1

(ii) 0

(iii) -1

(iv) 2

Contd.

47 (Sem-1) BUMA 1-3/G 2

(e) If TC , MC , AC and x represent the total cost, marginal cost, average cost and output respectively, then which of the following are true ?

(i) $\frac{d}{dx}TC = MC$

(ii) $\frac{TC}{x} = AC$

(iii) $\int MC dx = TC$

(iv) (i), (ii) and (iii)

(f) If α and β be the roots of the equation $x(x-3)=4$ then the value of $\alpha^2 + \beta^2$ is

(i) 17

(ii) 16

(iii) 2

(iv) 8

(g) The logarithms of 512 to the base $2\sqrt{2}$:

(i) 3

(ii) 4

(iii) 5

(iv) 6

(b) If a, b, c are in G.P. and if p is the A.M. between a, b and q is the A.M.

between b, c , prove that $\frac{a}{p} + \frac{c}{q} = 2$.

3

(c) If α, β be the roots of $5x^2 - 10x + 1 = 0$ then form the equation whose roots are

$\frac{1-\alpha}{1+\alpha}$ and $\frac{1-\beta}{1+\beta}$. 3

(d) Find the value of 3

$7 \log \frac{16}{15} + 5 \log \frac{25}{24} + 3 \log \frac{81}{80}$

4. (a) Evaluate : 2x4=8

(i) $\lim_{x \rightarrow 0} \frac{a - \sqrt{a^2 - x^2}}{x^2}$

(ii) $\lim_{x \rightarrow 0} \frac{\sqrt{1+2x} - \sqrt{1-2x}}{x}$

(iii) $\lim_{x \rightarrow 2} \frac{x^2 - 5x + 6}{x^2 - 7x + 10}$

(iv) $\lim_{x \rightarrow \infty} \frac{3x^2 + 7x + 2}{5x^2 - 2x + 5}$

(b) A function is defined in (0,3) in the following way — 4

$$f(x) = x^2, 0 < x \leq 1$$

$$= x, 0 < x \leq 2$$

$$= \frac{1}{4}x^3, 2 \leq x < 3$$

Is $f(x)$ continuous at $x=2$?

5. (a) Find derivative $\frac{dy}{dx}$: (any three)

2×3=6

(i) $y = \frac{x-1}{x+1}$

(ii) $y = 5^x \cdot x^5$

(iii) $y = (x-1)^2(x+2)$

(iv) $y = (3x+8)^6$

(b) The total cost of output x given by

$$C = \frac{2}{3}x + \frac{35}{2}. \text{ Find : } 6$$

(i) Cost when output is 4 units.

- (ii) Average cost of output of 10 units
- (iii) Marginal cost when output is 3 units

6. (a) Solve the following LPP graphically :

Maximize $Z = 3x + 2y$

subject to $2x + y \leq 100$

$$x + y \leq 80$$

$$x \leq 40$$

$$x, y \geq 0$$

6

(b) What do you mean by LPP? Give the advantage and disadvantage of LPP. 2+4=6

7. (a) Prove that the middle term of

$$\left(x + \frac{1}{2x}\right)^{2n} \text{ is } \frac{1 \cdot 2 \cdot 5 \dots (2n-1)}{n!} 3$$

(b) Expand the following :

$$(2 + 3x^2)^7. 3$$

(c) Find the coefficient of x^{10} in $(2 + 7x^2)^8$. 3

(d) Using binomial theorem, find the value of $(1.02)^5$ correct to 3 places of decimal. 3

8. (a) Find the inverse of matrix 4

$$A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$$

- (b) Show that

$$\begin{vmatrix} a-b-c & 2a & 2a \\ 2b & b-c-a & 2b \\ 2c & 2c & c-a-b \end{vmatrix} = (a+b+c)^3$$

- (c) Solve by Cramer's Rule: 4

$$\begin{aligned} 2x + y + z &= 1 \\ x - y + 2z &= -1 \\ 3x + 2y - z &= 4 \end{aligned}$$

9. (a) Find the sum of n terms of the following Series: 4
 $9 + 99 + 999 + \dots$

- (b) The sum of three consecutive terms in A.P. is 24 and this product is 440, find the terms. <https://www.assampapers.com>

- (c) A man borrows Rs 12,000 and promises to pay back in 20 instalments, each of value Rs 30 more than the last. Find the first instalment. 4

10. (a) If $f(x) = \frac{3x+2}{3x-2}$, show that 3
 $\frac{f(x)+1}{f(x)-1} = \frac{3x}{2}$

- (b) If $f(x) = \frac{|x|}{x}$ and c is any real number ($\neq 0$), show that 3
 $|f(c) - f(-c)| = 2$

- (c) A, B and C are any three sets, prove that $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ 3

- (d) In a classroom of 120 students, 80 read Assam Tribune, 55 read the Hindu, 25 read the both. How many students read neither Assam Tribune nor the Hindu? 3

11. (a) Integrate the following: 3×3=9

(i) $\int x e^x dx$

(ii) $\int \frac{\log(\tan^{-1} x)}{1+x^2} dx$

(iii) $\int_2^4 \frac{x}{1+x^2} dx$

- (b) The Marginal Cost (MC) of a product is given by $MC = Rs (20 + 30x - 15x^2)$ and the fixed cost is known to be Rs 550. Find the total cost function. 3

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