

(8 pages)

Reg. No. : .....

Code No. : 22978 E Sub. Code : SMBA 22

B.B.A. (CBCS) DEGREE EXAMINATION, APRIL 2019.

Second Semester

Business Administration – Main

BUSINESS MATHEMATICS

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The distance between the points  $(-3, 3)$  and  $(5, 9)$  is
- (a) 2  
(b) 6  
(c) 10  
(d) 8

2. The slope of the line joining the points  $(-2, 3)$  and  $(8, -5)$  is
- (a)  $\frac{4}{5}$  (b)  $-\frac{4}{5}$   
(c)  $\frac{5}{4}$  (d)  $-\frac{5}{4}$
3.  $\frac{d}{dx} (\sqrt{x}) =$
- (a)  $\sqrt{x}$  (b)  $\frac{1}{\sqrt{x}}$   
(c)  $\frac{2}{\sqrt{x}}$  (d)  $\frac{1}{2\sqrt{x}}$
4.  $\frac{d}{dx} (\log x) =$
- (a) 1 (b)  $\frac{1}{x}$   
(c)  $\log x$  (d)  $\log 1$
5. If a function  $y = f(x)$  has a minimum at  $x = a$ , then  $\frac{dy}{dx} =$
- (a) 0 (b) 1  
(c) -1 (d) infinite



6. At the point of inflexion,  $\frac{d^2y}{dx^2} =$
- (a) 0 (b) 1  
(c) a positive (d) a negative
7. The simple interest earned by Rs. 6,000 at 15% p.a. in 2 years is
- (a) Rs. 900 (b) Rs. 1800  
(c) Rs. 3600 (d) Rs. 3000
8. An annuity payable unconditionally for a fixed number of periods is called \_\_\_\_\_
- (a) Annuity due (b) Immediate annuity  
(c) Annuity certain (d) Deferred annuity
9. If  $A = \begin{pmatrix} 2 & 3 \\ -1 & 4 \end{pmatrix}$  and  $B = \begin{pmatrix} 5 & -2 \\ -1 & 6 \end{pmatrix}$ , then  $A - B =$
- (a)  $\begin{pmatrix} -3 & 1 \\ 0 & +2 \end{pmatrix}$  (b)  $\begin{pmatrix} -3 & 5 \\ -2 & 2 \end{pmatrix}$   
(c)  $\begin{pmatrix} 3 & 1 \\ 0 & 2 \end{pmatrix}$  (d)  $\begin{pmatrix} -3 & 5 \\ 0 & -2 \end{pmatrix}$
10. If  $AX = B$ , then  $X =$
- (a)  $AB$  (b)  $BA^{-1}$   
(c)  $A^{-1}B$  (d)  $A^{-1}B^{-1}$

Page 3 Code No. : 22978 E

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Answer should not exceed 250 words.

11. (a) Find the point of intersection of the lines  $5x + 2y = 11$  and  $x - 3y = 9$ .

Or

- (b) The total factory cost  $y$  of making  $x$  units of a product is given by  $y = 5x + 300$ . If 75 units are produced, find:

- (i) the fixed cost  
(ii) the variable cost  
(iii) the total cost  
(iv) the average cost per unit  
(v) the marginal cost.

12. (a) Find:  $\frac{d}{dx} \left( e^x + x^2 + \frac{1}{x} \right)$ .

Or

- (b) Find:  $\frac{d}{dx} \left( \frac{1}{2x+5} \right)$ .

Page 4 Code No. : 22978 E

[P.T.O.]



13. (a) Examine the cost function  $y = 10 - 2x + x^2$  for maximum or minimum.

Or

- (b) Write the steps by step procedure to find the maxima and minima of a function of one variable.
14. (a) Find the principal which yields simple interest of Rs. 77 in 8 years at  $3\frac{1}{2}\%$  per annum.

Or

- (b) Find the compound interest on Rs. 8,000 for 3 years if interest is payable half yearly at the rate of 8% p.a.
15. (a) If  $A = \begin{pmatrix} 2 & 3 \\ -1 & 1 \end{pmatrix}$  and  $B = \begin{pmatrix} 1 & 0 & 2 \\ -2 & 3 & 1 \end{pmatrix}$ , find  $AB$ .

Or

- (b) Find the Inverse of the matrix  $\begin{pmatrix} 1 & -1 & 2 \\ 1 & 1 & 0 \\ 1 & 0 & -1 \end{pmatrix}$ .

Page 5 Code No. : 22978 E

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Answer should not exceed 600 words.

16. (a) (i) Find the equation of the line whose slope is  $\frac{3}{2}$  and which cuts off 3 units along the  $y$ -axis.
- (ii) Find the equation of the line which passes through the points  $(-3, 1)$  and  $(2, -1)$ .

Or

- (b) A company expects fixed costs to be Rs. 30,000 and variable cost be Rs. 42,000, when the sales is Rs. 60,000. Find:
- (i) The equation relating sales and expenses
- (ii) The break even point
- (iii) The profit when the sales is Rs. 1,20,000.

Page 6 Code No. : 22978 E





17. (a) Find  $\frac{d}{dx}$  if

(i)  $y = e^x \log x$

(ii)  $y = \frac{2x+1}{3x-2}$ .

Or

(b) The total cost  $C$  of making  $x$  units of a product is

$$C = 0.00003x^3 - 0.045x^2 + 8x + 2500.$$

Find the marginal cost of 1000 units output.

18. (a) Investigate the maxima and minima for the function  $y = x^3 - 3x + 1$ .

Or

(b) A telephone company has a profit of Rs. 2 per telephone when the number of telephones in the exchange is not over 10000. The profit per telephone decreases by 0.01 paise for each telephone over 10000. Find the maximum possible profit?

19. (a) What sum of money invested at 10% per annum simple interest will amount to Rs. 1200 in 2 years?

Or

(b) Find the amount for an annuity of Rs. 2000 per year paid at the beginning of each year for 10 years allowing compound interest at 5%.

20. (a) Solve the following system of equations using matrix inversion.

$$3x + 2y + z = 16$$

$$2x + 3y + 2z = 23$$

$$5x + 2y + 2z = 21.$$

Or

(b) Find the inverse of the matrix

$$A = \begin{pmatrix} 2 & 3 & 4 \\ 3 & 5 & 6 \\ 4 & 6 & 7 \end{pmatrix}.$$

