R(5th Sm.)-Advanced Business Math.-H/DSE-5.1A/CBCS

## 2020

# ADVANCED BUSINESS MATHEMATICS — HONOURS

## Paper : DSE-5.1A

#### (Module - II)

### Full Marks: 40

The figures in the margin indicate full marks. Candidates are required to give their answers in their own words as far as practicable.

Answer any four questions.

1. (a) Evaluate :  $\log_{x\to 0} \frac{x}{\sqrt{1+x} - \sqrt{1-x}}$ .

(b) The total cost C of producing x items is given by  $C = \begin{cases} 100+5x, 0 \le x \le 500\\ 2000+4x, 500 < x \le 2000 \end{cases}$ Show that C is discontinuous at x = 500.

2. (a) If  $A-2B = \begin{bmatrix} -7 & 7 \\ 4 & -8 \end{bmatrix}$  and  $A-3B = \begin{bmatrix} -11 & 9 \\ 4 & -13 \end{bmatrix}$ , find the matrices A and B.

(b) Prove that 
$$\begin{vmatrix} x & y & z \\ x^2 & y^2 & z^2 \\ x^3 & y^3 & z^3 \end{vmatrix} = xyz(x-y)(y-z)(z-x).$$
 5+5

3. (a) Evaluate :  $\int \frac{(4x-3)^3}{x^2} dx$ .

(b) Find 
$$\frac{d^2y}{dx^2}$$
, if  $y^3 + 3ax^2 + x^3 = 0$ . 5+5

**Please Turn Over** 

10×4=40

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4. (a) If 
$$y = \log\left(x + \sqrt{1 + x^2}\right)$$
, then show that  $(1 + x^2)y_2 + xy_1 = 0$ .

(b) A firm produces x tonnes of output at a total cost Rs. R where  $R = \frac{1}{10}x^3 - 5x^2 + 10x + 5$ . Find at what level of output, average cost be minimum and what level will it be. 5+5

(2)

- 5. (a) Find the area included between  $y^2 = 9x$  and y = x.
  - (b) The price p and quantity q of a commodity are related by  $q = 32 4p p^2$ ; find the marginal revenue when p = 3.

6. (a) Evaluate : 
$$\int \frac{dx}{\sqrt{x+1} - \sqrt{x-1}}$$

(b) Evaluate : 
$$\int \frac{5x+2}{(x-2)(x-3)} dx.$$
 5+5

7. (a) Solve by Cramer's Rule the following set of equations : 2x + 3y - z = 9; x + y + z = 9; 3x - y - z = -1.

(b) Verify that the matrix 
$$A = \frac{1}{3} \begin{bmatrix} -1 & 2 & -2 \\ -2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$$
 is an orthogonal matrix. 5+5

8. Find the inverse of  $\begin{bmatrix} 1 & 1 & -2 \\ -2 & 1 & -2 \\ 1 & 0 & 2 \end{bmatrix}$  and hence solve the following system of equations x + y - 2z = 4; -2x + y - 2z = 1; x + 2z = 3.