

Sl. No. 502

BCAT 114

No. of Printed Pages : 6

Following Paper ID and Roll No. to be filled in your Answer Book.

**PAPER ID : 1104**

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## BCA Examination 2018-2019

(First Semester)

MATHEMATICS - I

*Time : Three Hours]*

*[Maximum Marks : 100*

Note :— Attempt all questions.

### Section-A

1. (a) Fill in the blanks :

- (i) Inverse of Matrix A does not exist if A is .....
- (ii) A Square Matrix A is Orthogonal Matrix if .....
- (iii) If at  $x = a$ ,  $f'(a) = 0$  and  $f''(a) < 0$  then  $f(x)$  is .....
- (iv) nth derivative of  $e^{ax}$  is .....

*[ P. T. O.*

(v) A point  $x = a$  is maximum point for  $y = f(x)$  if .....

(vi) Angle  $\psi$  between the tangent and radius vector is given by .....

(vii) If  $f(x)$  is odd then  $\int_{-a}^a f(x) dx = \dots\dots\dots$

(viii) Asymptote of the curve

$(x^2 - a^2) y^2 + xy = 0$  parallel to  $x$  - axis is .....

(ix)  $\int \operatorname{cosec} x dx = \dots\dots\dots$

(x) If  $y = vx$  then  $\frac{dy}{dx} = \dots\dots\dots$

(b) State True/False :  $1 \times 10 = 10$

(i) Matrix  $A$  is said to be idempotent matrix if  $A^2 = A$

(ii) The rank of any singular matrix of order  $n$  is zero

(iii) Curve  $y = f(x)$  is neither maximum non minimum at  $x = a$  if  $f'' = 0$

(iv) Every polynomial function is continuous.

(v) A closed curve has many asymptotes

(vi)  $\int_a^b f(x)dx = f(a) + f(b)$

(vii)  $\int_0^1 (x+1) dx = 3$

(viii) The process of determining the length of arc of plane curve is called quadrature.

(ix)  $\frac{dy}{dx} + \frac{x}{y} = x$  is homogeneous.

(x) The equation of the tangent at point  $(x, y)$  on the curve  $y = f(x)$  is

$$y - y = f'(x)(X - x).$$

### Section-B

2. Attempt any three parts of the following :

(a) Using determinant, solve following equations :

$$x + y + 2z = 3, x - 3y + z = z, 3x + y + z = 5$$

*[ P. T. O. ]*

(b) Compute the maximum value of  $(x)^{\frac{1}{x}}$ .

(c) If  $Z = f(r)$  where  $r^2 = x^2 + y^2$  then find

$$\frac{\partial^2 Z}{\partial x^2} + \frac{\partial^2 Z}{\partial y^2}.$$

(d) Evaluate :

$$\int_0^{\pi/2} \frac{\sqrt{\tan x}}{\sqrt{\tan x} + \sqrt{\cot x}} dx.$$

(e) Solve :

$$(1+x) \frac{dy}{dx} = x(y+1)$$

### Section-C

Attempt one part from each question.

3. (a) Find Inverse of following matrix by Cayley Hamilton process :

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

(b) Evaluate following determinant :

$$\begin{vmatrix} x & y & z \\ x^2 & y^2 & z^2 \\ x^3 & y^3 & z^3 \end{vmatrix}$$

4. (a) Expand  $\cos x$  in powers of  $(x - \pi/4)$ .  
(b) If  $y = (x^2 - 1)^n$  Then find its  $n$ th derivative.
5. (a) Find the asymptotes of  
$$x^2 + 2xy + 3y^2 + x - y + 2 = 0$$
  
(b) Find the area bounded by the curves  $y^2 = 4x$   
and  $x^2 = 4y$ .
6. (a) Find the length of the curve  $y = \log \sec x$   
between points  $x = 0$  and  $x = \pi/3$ .  
(b) Find the whole area of the curve  
$$x^{2/3} + y^{2/3} = a^{2/3}$$
7. (a) Solve the differential equation

$$x \frac{dy}{dx} + \frac{x^2}{y} = x^3 + 1$$

[ P. T. O. ]

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(b) Solve following differential equation

$$(x + y + 1) dy - (2x + 2y + 3) dx = 0$$

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