

H-3829**B.C.A. (Part-II) Examination, 2024****Paper - I****CALCULUS AND DIFFERENTIAL
EQUATIONS****(BCA-201)****Time Allowed : Three Hours****Maximum Marks : 80**

Note : Attempt any two parts from each unit. All questions carry equal marks.

UNIT-I

- Q. 1.** (a) Define removable, first kind and second kind discontinuities with examples.
- (b) Show that the following function $f(x)$ is continuous at $x = 0$ but not differentiable at $x = 0$:

H-3829**P.T.O.****(2)**

$$f(x) = \begin{cases} \frac{xe^{1/x}}{1+e^{1/x}} & , x \neq 0 \\ 0 & , x = 0 \end{cases}$$

- (c) State and prove intermediate value theorem.

UNIT-II

- Q. 2.** (a) If $f(x) = \frac{x}{(x-1)(x-2)}$ then find the n^{th} derivative of $f(x)$.

- (b) If $I_n = \frac{d^n}{dx^n}(x^n \log x)$ prove that $I_n = n I_{n-1} + (n-1)!$

- (c) If $y = \frac{\sin^{-1} x}{\sqrt{1-x^2}}$, prove that :

$$(1-x^2) y_{n+1} - (2n+1) x y_n - n^2 y_{n-1} = 0$$

UNIT-III

- Q. 3.** (a) Evaluate :

$$\int \frac{dx}{(e^x - 1)^2}$$

H-3829

(3)

(b) Evaluate :

$$\int \frac{dx}{5 + 4 \cos x}$$

(c) Integrate :

$$\int e^{ax} \cos bx \, dx$$

UNIT-IV

Q. 4. (a) Evaluate :

$$\int_0^{\pi/2} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$$

(b) Evaluate :

$$\int_0^{\pi/2} \frac{x \, dx}{\sin x + \cos x}$$

(c) Prove that :

$$\int_0^{\pi/2} \log \sin x \, dx = -\frac{\pi}{2} \log 2$$

UNIT-V

Q. 5. (a) Solve :

$$x \, dy - y \, dx = \sqrt{x^2 + y^2} \, dx$$

(4)

(b) Obtain the differential equation from the equation

$$x^2 y = 1 + cx$$

Also find degree and order.

(c) Solve :

$$x(x - y) \, dy + y^2 \, dx = 0$$

<https://www.prsunotes.com>

Whatsapp @ 9300930012

Send your old paper & get 10/-

अपने पुराने पेपर्स भेजे और 10 रुपये पायें,

Paytm or Google Pay से

H-3829

P.T.O.

<https://www.prsunotes.com>

H-3829

1,200

<https://www.prsunotes.com>