

PRSU BCA PART 2 QUESTION PAPER

PAPER 2 : DIFFERENTIATION & INTEGRATION-2017

Time : Three Hours]

[Maximum Marks : 50]

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

UNIT - 1

1. (a) If $y = a \cos(\log x) + b \sin(\log x)$, then prove that :

$$x^2 y_2 + xy_1 + y = 0$$

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

- (b) State and prove Lagrange's mean value theorem.

- (c) Expand $2x^3 + 7x^2 + x - 1$ in powers of $(x - 2)$ by Taylor's theorem.

UNIT - 2

2. (a) Find the asymptotes of $x^2 + 3xy + 2y^2 + 3x - 2y + 1 = 0$.

- (b) For the curve $y = x^3 + 2x^2 + x + 1$, find the equation of the circle of curvature at the point $(0, 1)$.

- (c) Trace the curve $xy^2 = 4a^2(2a - x)$.

UNIT - 3

3. (a) If $u = \log(x^3 + y^3 + z^3)$ then find the value of :

$$\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z}$$

- (b) Let $f(x, y, z) = x^2 - y^2 + 2yz$ and $a = (1, 0, -2)$ then find the directional derivative of f at the point $r(1, 1, -1)$ in the direction of a .

- (c) If $x = r \sin \theta \cos \phi$, $y = r \sin \theta \sin \phi$, $z = r \cos \phi$, then show

that $\frac{\partial(x, y, z)}{\partial(r, \theta, \phi)} = r^2 \sin \phi$

UNIT - 4

4. (a) Evaluate : $\int \frac{3x+5}{\sqrt{x^2+6x+5}} dx$

- (b) Prove that : $\int_0^{\pi/4} \log(1 + \tan \theta) d\theta = \frac{\pi}{8} \log 2$

- (c) Evaluate : $\int \sqrt{1 + \sin x} dx$

UNIT - 5

5. (a) Show that : $\int_0^1 \int_{x^2}^x \int_0^{xy} dx dy dz = \frac{1}{24}$

- (b) Evaluate the following integral by changing the order of

- integration : $\int_0^1 \int_{x^2}^{2-x} xy dx dy$

- (c) Find the complete area of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$