

J-275

B.C.A. (Part-II) Examination, 2021
(Theoretical Foundation of Computer Science)
Paper - II

DIFFERENTIATION AND INTEGRATION*Time Allowed : Three Hours**Maximum Marks : 50**Minimum Pass Marks : 20*

Note : Attempt all the five questions. One question from each unit is compulsory. All questions carry equal marks.

Unit-I

Q. 1. Find the n^{th} differential coefficients of the following : **10**

$$e^x \cdot \log x$$

Q. 2. Verify Rolle's theorem in the interval $[-1, 1]$ for the function : **10**

$$f(x) = x^2$$

J-275**P.T.O.****(2)****Unit-II**

Q. 3. Find the asymptotes of the curve : **10**

$$x^3 + 2x^2y - xy^2 - 2y^3 + xy - y^2 - 1 = 0$$

Q. 4. Find the radius of curvature at the point (p, r) of

the ellipse : **10**

$$\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2} - \frac{r^2}{a^2b^2}$$

Unit-III

Q. 5. If $u = \log (x^3 + y^3 + z^3 - 3xyz)$, prove that : **10**

$$\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = \frac{3}{x+y+z}$$

Q. 6. If $x + y + z = u$

$$y + z = uv$$

$$z = uvw$$

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(3)

then prove that :

10

$$\frac{\partial(x, y, z)}{\partial(u, v, w)} = u^2 v$$

Unit-IV

Q. 7. Evaluate :

10

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

Q. 8. Evaluate :

10

$$\int \frac{3x+1}{(x-1)^3(x+1)} dx$$

Unit-V

Q. 9. Find the area bounded by the cardioid :

10

$$r = \alpha(1 + \cos \theta)$$

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P.T.O.

(4)

Q. 10. Find the length of the arc of the semi-cubical

parabola :

10

$$ay^2 = x^3$$

from its vertex to the point (α, α)

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100