OR

If ρ_1 and are radii of curvature at the end points (extremities) of any chord through pole of the cardioid , then prove that :

$$9\left(\rho_1^2+\rho_2^2\right)=16a^2$$

Q.3 If $u=\log\left(x^3+y^3+z^3-3xyz\right)$ then prove that :

$$\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}+\frac{\partial^2 u}{\partial z^2}=\frac{3}{(x+y+z)^2}$$

OR

Show that the functions :

$u=x+y-z,\ v=x-y+z,\ w=x^2+y^2+z^2-2yz$

are not independent to each other. Hence show that :

$$(u+v)^2+(u-v)^2=4w$$

Q.4 Evaluate $\int \cos x\cos 2x\cos 3x\,dx$.

OR

Prove that .

Q.5 Show that the area bounded by two circles $r=a\sqrt{2}$ and $r=2a\cos\theta$ is :

OR

Evaluate where *R* is the region bounded above the straight line $y=x$ and within the parabola .

---x---

Roll No.....

Total No. of Sections : 03
Total No. of Printed Pages : 04

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Annual Examination - 2019

BCA Part - II

BCA-201

THEORETICAL FOUNDATION OF COMPUTER SCIENCE

Paper - II

DIFFERENTIATION AND INTEGRATION

Max.Marks : 50

Time : 3 Hrs. **Min.Marks : 20**

Note : Section 'A', containing 10 very short-answer-type questions, is compulsory. Section 'B' consists of short answer type questions and Section 'C' consists of long answer type questions. Section 'A' has to be solved first.

$\int_0^{\pi/4}\log(1+\tan x)\,dx=\frac{\pi}{8}\log 2$

$\frac{\partial(u,v)}{\partial(x,y,z)}$

Section - 'A'

Answer the following very short-answer-type questions in one or two sentences : **(1×10=10)**

Q.1 Write the n[th] derivative of cos .

Q.2 Write the statement of Leibneitz theorem.

Q.3 Write the formula of radius of curvature for polar equation.

Q.4 Write the test for point of inflexion.

Q.5 If then evaluate $\frac{\partial^2 f}{\partial x\,\partial y}$.

Q.6 Write the test for point of inflexion .

Q.7 Evaluate $\int_0^{\pi/2}\frac{\sqrt{\sin x}}{\sqrt{\sin x}+\sqrt{\cos x}}\,dx$

P.T.O.

Q.8 Evaluate .

Q.9 Evaluate $\int_0^1\int_0^1 \frac{dxdy}{\sqrt{1-x^2}\sqrt{1-y^2}}$.

Q.10 Write the formula for length of curve of the parametric equation $x=f(t),\ y=g(t)$ from t_1 to .

Section - 'B'

Answer the following questions : **(3 5=15)**

Q.1 Find the value of C of the Rolle's theorem for the function in the closed interval .

OR

If then show that :

$$\left(1-x^2\right)\cdot\frac{d^2y}{dx^2}-x\cdot\frac{dy}{dx}+m^2y=0$$

Q.2 If the point of inflexion of the curve be $(-1,\ 2)$ then show that $a=1,\ b=3$.

OR

For any curve prove that where is the radius of curvature and .

Q.3 Find the directional derivative of the surface $\phi=3x^2yz-4y^2z^2$ at the point $(2,-1,3)$ in the direction of vector $3i-4j+2k$.

OR

If then show that .

Q.4 Prove that $\int_0^{\pi/2}\frac{dx}{a^2\cos^2x+b^2\sin^2x}=\frac{\pi}{2ab}$.

OR

Evaluate $\int\frac{x+8}{\sqrt{x^2+2x+5}}dx$.

Q.5 Change the order of integration in $\int_0^1\int_y^1 x^2\cos\left(x^2-xy\right)dydx$.

OR

Find the perimeter (complete length) of the cardioid $r=a(1-\cos\theta)$.

Section - 'C'

Answer the following questions : **(5×5=25)**

Q.1 If then show that , and .

OR

By using Lagrange's mean-value theorem in prove that :

where $x>0$

Q.2 Trace the curve .