Q.2 Find the radius of curvature at the point (r,) to the curve $r^n = a^n \sin n$.

OR

Find the intervals for which the following curves are concave upwards or downwards:

Q.3 If u= x+y-z, v= x-y+z, then show that

$$\frac{\partial(u,v,w)}{\partial(x,y,z)}=0$$

OR

If $u = xf(x+y) + y\Phi(x+y)$, then prove that

Q.4 Evaluate $\int \frac{2x+5}{\sqrt{x^2+3x+1}}\,dx$.

OR

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

Q.5 When the region of integration R is the triangle bounded by y = 0, y = x and x =1, show that.

$$\iint_R \sqrt{4x^2-y^2}\,.\,dx\,dy = \frac{1}{3}\left(\frac{\pi}{3}+\frac{\sqrt{3}}{2}\right)$$

OR

Trace the curve $ay^2 = x^2(a-x)$ and show that area of its loop is $\frac{8a^2}{15}$.

---x---

Roll No..... Total No. of Sections : 03

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Annual Examination - 2018

BCA - Part II

BCA - 201

THEORETICAL FOUNDATION OF COMPUTER SCIENCE

Paper - II

DIFFERENTIATION AND INTEGRATION

Max.Marks : 50

$\frac{\partial^2}{\partial x^2} - 2\frac{\partial^2}{\partial x\partial y} + \frac{\partial^2}{\partial y^2} = 0$ **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.

Section - 'A'

Answer the following very short-answer-type questions : **(1×10=10)**

Q.1 Write the n^{th} derivative of .

Q.2 Write the statement of Maclaurin's theorem.

Q.3 Find the asymptotes parallel to x-axis to the curve

Q.4 Show that the curve $y = e^x$ is concave upwards everywhere.

P.T.O.

Q.5 If f (x,y) = $2x^2$-xy+$2y^2$, find fy (1, 2).

Q.6 Find the directional detivative of at the point (1,1,1)

in the directions : = i.

Q.7 Find the value of $x\,dx$.

Q.8 Evaluate .

Q.9 Evaluate $\int_0^{\pi/2}\int_0^{a\cos\theta} r\sin\theta\,d\theta\,dr$

Q.10 Evaluate $\int_0^1$ $(x+y)\,dxdy$.

Section - 'B'

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

Q.1 Verify Lagrange's mean value theorem for the function in the internal [2,4].

OR

If sin *x*, then prove that $\frac{d^4y}{dx^4}+4y=0$.

Q.2 Find all the asymptotes of the curve

OR

Prove that the radius of curvature of the point (*x*,y) of the catenary is

Q.3 If then prove that

OR

Find the directional derivative of in the direction of the vector $3i-4j+2k$ at the point (2,-1,3).

Q.4 Evaluate

OR

Find the value of $\int_0^{\pi/2}$ sin 2*x* log (tan *x*) d_n

Q.5 Evaluate .

OR

[illegible] $+n(n+1)y_n=0$

Find the area of the position of the parabola $y^2=4ax$ included between the x-axis, the ordinate *x*=2a and the latus-rectum.

Section - 'C'

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

Q.1 If y = e $\tan^{-1}x$ then prove that and

OR

If then find the value of θ

when