DIFFERENTIAL CALCULUS- APPLICATION II

PART – A

QUES.NO.,	QUESTION
1	If $u = x^y$ then $\frac{\partial u}{\partial x}$ is equal to
2	If $u = \sin^{-1}\left(\frac{x^4+y^4}{x^2+y^2}\right)$ and f = sin u then f is a homogeneous function of degree
3	If $u = \frac{1}{\sqrt{x^2+y^2}}$, then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ is equal to
4	The curve $y^2(x-2) = x^2(1+x)$ has
5	If $x = r\cos\theta$, $y = r\sin\theta$, then $\frac{\partial r}{\partial x}$ is equal to
6	Identify the true statements in the following :
	(i) If a curve is symmetrical about the origin, then it is symmetrical about both axes.
	(ii) If a curve is symmetrical about both the axes, then it is symmetrical about the origin.
	(iii) A curve $f(x, y) = 0$ is symmetrical about the line $y = x$ if $f(x, y) = f(y, x)$.
	(iv) For the curve $f(x, y) = 0$, if $f(x, y) = f(-y, -x)$, then it is symmetrical about the origin.
7	If $u = \log\left(\frac{x^2+y^2}{xy}\right)$ then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ is
8	The percentage error in the 11th root of the number 28 is approximately _____ times the percentage error in 28.

9	The curve $a^2y^2 = x^2\ (a^2 - x^2)$ has
10	An asymptote to the curve $y^2\ (a + 2x) = x^2\ (3a - x)$ is
11	If $u = y \sin x$, then $\frac{\partial^2 u}{\partial x\, \partial y}$ is equal to
12	In which region the curve $y^2(a + x) = x^2\ (3a - x)$ does not lie?
13	If $u = f\left(\frac{y}{x}\right)$ then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ is equal to
14	The curve $9y^2 = x^2(4 - x^2)$ is symmetrical about
15	The curve $ay^2 = x^2\ (3a - x)$ cuts the y-axis at

PART - B

1) Use differentials to find an approximate value for the given number

$\sqrt{36.1}$

2)

Use differentials to find an approximate value for $\sqrt[3]{65}$.

$\frac{1}{10.1}$

3) ***Example 6.5 :*** The time of swing T of a pendulum is given by $T = k\sqrt{l}$ where k is a constant. Determine the percentage error in the time of swing if the length of the pendulum l changes from 32.1 cm to32.0 cm.

4)

If $w = x + 2y + z^2$ and $x = \cos t$; $y = \sin t$; $z = t$. Find $\frac{dw}{dt}$

5)

Find $\frac{\partial w}{\partial r}$ and $\frac{\partial w}{\partial \theta}$ if $w = \log(x^2 + y^2)$ where $x = r\cos\theta, y = r\sin\theta$

6)

If V = $ze^{ax + by}$ and z is a homogenous function of degree n in x and y prove that $x\frac{\partial V}{\partial x} + y\frac{\partial V}{\partial y} = (ax + by + n)V$.

7)

Example 6.22 : Using Euler's theorem, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \frac{1}{2}\tan u$ if $u = \sin^{-1}\left(\frac{x - y}{\sqrt{x} + \sqrt{y}}\right)$

8)

Using Euler's theorem prove the following :

(i) If $u = \tan^{-1}\left(\frac{x^3 + y^3}{x - y}\right)$ prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \sin 2u$.

9)

Verify Euler's theorem for $f(x,y) = \frac{1}{\sqrt{x^2 + y^2}}$

10)

Verify $\frac{\partial^2 u}{\partial x\,\partial y} = \frac{\partial^2 u}{\partial y\,\partial x}$ for the following functions :

$u = \tan^{-1}\left(\frac{x}{y}\right)$.

11)

Verify $\frac{\partial^2 u}{\partial x\,\partial y} = \frac{\partial^2 u}{\partial y\,\partial x}$ for the following functions :

$u = \frac{x}{y^2} - \frac{y}{x^2}$

12)

Verify $\frac{\partial^2 u}{\partial x\, \partial y} = \frac{\partial^2 u}{\partial y\, \partial x}$ for the following functions :

$u = \sin 3x \cos 4y$

13)

Use differentials to find an approximate value for the given number

$y = \sqrt[3]{1.02} + \sqrt[4]{1.02}$

14)

If $w = u^2 e^v$ where $u = \frac{x}{y}$ and $v = y \log x$, find $\frac{\partial w}{\partial x}$ and $\frac{\partial w}{\partial y}$