TELANGANA UNIVERSITY
S.S.R. DEGREE COLLEGE, NIZAMABAD (C.C:5029)
I SEMESTER INTERNAL ASSESSMENT I EXAMINATIONS
MATHEMATICS QUESTION BANK

I. Multiple choice questions.

1. If $u = \mathrm{Sin}^{-1}\left[\frac{\sqrt{x}-\sqrt{y}}{\sqrt{x}+\sqrt{y}}\right]$, then [b]

a. $\frac{\partial u}{\partial x} = -\frac{x}{y}\frac{\partial u}{\partial y}$ b. $\frac{\partial u}{\partial y} = -\frac{x}{y}\frac{\partial u}{\partial x}$ c. $\frac{\partial u}{\partial x} = \frac{x}{y}\frac{\partial u}{\partial y}$ d. $\frac{\partial u}{\partial y} = \frac{x}{y}\frac{\partial u}{\partial x}$

2. If $Z = \frac{(x+y)}{(x-y)^2}; x \neq y$ then $\frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} =$ [b]

a. $\frac{2(x+y)}{(x-y)^2}$ b. $\frac{2}{(x-y)}$ c. $\frac{-2}{(x-y)}$ d. None of these

3. If $Z = \mathrm{Tan}^{-1}\left(\frac{y}{x}\right)$ then dz = _____________ [d]

a. $\frac{xdy+ydx}{x^2+y^2}$ b. $\frac{xdx-ydy}{x^2+y^2}$ c. $\frac{xdx+ydy}{x^2+y^2}$ d. $\frac{xdy-ydx}{x^2+y^2}$

4. If u be a homogenous function of degree n, then $x\frac{\partial^2 u}{\partial x^2} + y\frac{\partial^2 u}{\partial x \partial y} =$ [b]

a) $n\frac{\partial u}{\partial x}$ b. $(n-1)\frac{\partial u}{\partial x}$ c. $(n+1)\frac{\partial u}{\partial x}$ d. None of these

5. $z = \mathrm{Tan}^{-1}\left[\frac{\sqrt{x}-\sqrt{y}}{\sqrt{x}+\sqrt{y}}\right]$, then $x\frac{\partial z}{\partial x} + y\frac{\partial z}{\partial y} =$ [b]

a) sinzcosz b. 0 c. tanz d. None of these

6. Euler's theorem on homogeneous function if "F" is a homogeneous of x, y, z of degree n, then [a]

a. $x\frac{\partial F}{\partial x} + y\frac{\partial F}{\partial y} + z\frac{\partial F}{\partial z} = nF$ b. $x\frac{\partial F}{\partial y} + x\frac{\partial F}{\partial x} = nz$

c. $x\frac{\partial F}{\partial x} - y\frac{\partial F}{\partial y} = nz$ d. $x\frac{\partial F}{\partial x} - y\frac{\partial F}{\partial y} - z\frac{\partial F}{\partial z} = nF$

7. If $y^3 - 3ax^2 + x^3 = 0$, then $\frac{d^2 y}{dx^2}$ = [a]

a. $-\frac{2a^2x^5}{y^5}$ b. $\frac{2ax-x^2}{y^2}$ c. $\frac{-2(x-a)}{y^5}$ d. None

8. The conditions for maximum (or) minimum values are [b]

a. $h\frac{\partial f}{\partial x} = 0, K\frac{\partial f}{\partial y} = 0$ b. $\frac{\partial f}{\partial x} = 0, \frac{\partial f}{\partial y} = 0$ c. $\frac{\partial^2 f}{\partial x^2} = 0, \frac{\partial^2 f}{\partial y^2} = 0$ d. None

9. If f(x,y,z) = $\frac{x^2}{y^2} + \frac{y^2}{z^2} + \frac{z^2}{x^2}$, then $xf_x + yf_y + zf_z$ = [a]

a. 0 b. -1 c. 1 d. 2

10. If f(x,y) = 0 then $\frac{d^2y}{dx^2}$ = [d]

a. $-\frac{\partial f}{\partial x}\frac{\frac{dx}{dx}}{\frac{\partial f}{\partial y}\cdot\frac{dy}{dx}}$

b. $-\frac{\frac{\partial f}{\partial x}\cdot\frac{dy}{dx}}{\frac{\partial f}{\partial y}\cdot\frac{dy}{dx}}$

c. $\frac{\frac{\partial^2 f}{\partial x^2}\left[\frac{\partial f}{\partial y}\right]^2+\frac{\partial^2 f}{\partial y^2}\left[\frac{\partial f}{\partial x}\right]^2}{\left(\frac{\partial f}{\partial y}\right)^3}$

d. $\frac{-\left[\frac{\partial^2 f}{\partial x^2}\right]\left[\frac{\partial f}{\partial y}\right]^2-2\frac{\partial^2 f}{\partial y.\partial x}\cdot\frac{\partial f}{\partial x}\cdot\frac{\partial f}{\partial y}+\frac{\partial^2 f}{\partial y^2}\left[\frac{\partial f}{\partial x}\right]^2}{\left(\frac{\partial f}{\partial y}\right)^3}$

II. Fill in the blanks.

1. If z = f(x,y) is a homogeneous function of x,y of degree 'n' then $x\frac{\partial z}{\partial x}+y\frac{\partial z}{\partial y}=nz$

2. If $u=\log\frac{x^2+y^2}{(x+y)}$, then $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}=1$

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

4. A function "f" is said to be continuous if it is <u>continuous</u> at every point of its domain.

5. The degree of the function $\log u=\frac{x^3+y^3}{3x+4y}$ is 2

6. The value of f(a,b) is called <u>maximum or minimum</u> value of f(x,y)

7. If a stationary point is maximum (or) minimum, then it is known as <u>extreme point</u>

8. The two repeated second order partial derivatives fxy, fyx are generally <u>Equal</u>

9. If u = x^2-y^2, v = xy then $n\frac{\partial x}{\partial u}=\frac{x}{2(x^2+y^2)}$

10. If 'H' is a homogeneous function of three variables x,y & z of degree 'n', then uler's for homogeneous function is

$$x\frac{\partial H}{\partial x}+y\frac{\partial H}{\partial y}+z\frac{\partial H}{\partial z}=nH$$

11. A function "f" is said to be continuous if it is <u>continuous</u> at every point of its domain

12. $u=x^y$ then $\frac{\partial u}{\partial y}=x^y\log(x)$

13. Langrange's conditions for maximum are <u>rt-s^2>0, and r<0</u>

14. If a stationary point is maximum (or) minimum, then it is known as <u>extreme point</u>

15. The value of the function at an extreme point is called <u>extreme value</u>

16. If Δx is increment in x, then Δy is <u>consequent increment</u> in y

17. If u = x^2-y^2, v = xy, then $n\frac{\partial x}{\partial u}=\frac{x}{2(x^2+y^2)}$

18. If $u=f\left(\frac{y}{x}\right)$ show that $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}=0$

19. Let f be a function of two variables x & y i.e f(x,y) = 0

20. If f(x,y) has continuous second order partial derivatives f_{xy} & f_{yx}. Then f_{xy} = f_{yx}

II. Short Answers

1. Find the first order partial derivative of $\sin^{-1}(x+y)$?

2. Find the second order partial derivative of e^{x+y}?

3. Write the Euler's theorem on homogeneous functions?

4. Find $\frac{\partial z}{\partial x}$ where z = cosxy

5. If u = $x^2 + y^2$, then the value of $\frac{\partial^2 u}{\partial x . \partial y}$?

6. If $z = xy^2 + x^2y$, $x = at^2$, $y = 2at$, Find the value of $\frac{dz}{dt}$?

7. If z = f(x,y), $x = e^u + e^{-v}$, $y = e^{-u} - e^v$ find $\frac{\partial z}{\partial u}$?

8. Find $\frac{dy}{dx}$, if $f(x,y) = x^3 - 3ax^2 + y^3$?

9. If $f(x,y) = ax^2 + 2hxy + by^2 + 2gx + 2fy + C = 0$. Find the values fx, fy ?

10. What is the degree of the function $z = \frac{x^3 + y^3}{x + y}$?