DIT UNIVERSITY DEHRADUN	
END TERM EXAMINATION, EVEN SEM 2020-21 (SEMESTER I)	
Name of Program	**B.Tech. (All)**
Subject Name: Engg. Mathematics I	**Subject Code: MAF101**
Time: 1 Hours	**Total Marks: 30**
Note: All questions carry equal weightage	
Press Submit Button after completion of Examination	
Name of Course Coordinator and Department	**Dr. Vinod Gupta, Assistant Professor, Mathematics**

1. The curve $y^2 - x(1-x^2) = 0$ exist if

(a) $x > 0 \; and \; x < -1$

(b) $x > 0, and \;\; x \; < 1$

(c) $x = 0$

(d) none of these

Ans. (b)

2. The Taylor's series expansion of $log(1+x)$ is equal to

(a) $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} - - - -$

(b) $x + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} \pm - -$

(c) $- x - \frac{x^2}{2!} - \frac{x^3}{3!} - \frac{x^4}{4!} - - - -$

(d) $x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} \pm$

Ans. (a)

3. Value of $\lim_{x\to\infty} \left(\frac{cos\, x}{x}\right)$ is

(a) 0

(b) 1

(c) ∞

(d) none of these

Ans. (a)

4. The function $f(x) = \frac{x\, e^{\frac{1}{x}}}{e^{1/x}+1}$

(a) is continuous at x=0

(b) is not continuous at x=0 because $LHL \neq RHL$

(c) is not continuous at x=0 because LHL and RHL does not exist

(d) is continuous at x=0 because $LHL = RHL = 0$

Ans. (a)

5. The function $f(x) = |x-1| + |3x+2|$ is

(a) continuous at $x = 1$ but not continuous at $x = -2/3$

(b) continuous but not differentiable at $x = 1,\ -2/3$

(c) continuous and differentiable at $x = 1,\ -2/3$

(d) none of these

Ans. (b)

6. The n^{th} derivative of $y = \sin(3x-1)$ is

(a) $y_n = \frac{1}{3^n}\cos(3x-1)$

(b) $y_n = 3^n \cos\left(3x-1+\frac{(n-1)\pi}{2}\right)$

(c) $y_n = \frac{(-1)^{n-1}}{3^n}\cos(3x-1)$

(d) $y_n = 3^n \sin\left(3x-1+\frac{n\pi}{2}\right)$

Ans. (d)

7. The curve $y^2 = \frac{x^3}{1+x}$ is symmetric about

(a) y axis

(b) x- axis

(c) Line y=x

(d) none of these

Ans. (b)

8. The asymptotes of the curve $y = \frac{(2x-1)(3x-5)}{6x^2}$ are

(a) $x = -1, y = 2x + 1$

(b) $x = 1, y = x$

(c) $x = 0, y = 1$

(d) $x = 0, y = x + 1$

Ans. (c)

9. If $u = \sqrt{\frac{x^2+y^2}{x+y}}\, tan^{-1}\left(\frac{y}{x}\right), then x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} atx = y = 1 is$

(a) $\frac{\pi}{4}$

(b) $\frac{\pi}{2}$

(c) π

(d) $-\frac{\pi}{4}$

Ans. (a)

10. If $v = \frac{\sqrt{(x^2+y^2+z^2)}}{2x + 3y-4z}$, then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z}$ is equal to

(a) -v

(b) v

(c) 2v

(d) 0

Ans. (d)

11. The function $xtan^{-1}\left(\frac{x}{y}\right) + y\ \sin^{-1}\left(\frac{y^2}{x^2}\right)$

(a) Homogeneous function of degree 1

(b) Homogeneous function of degree 2

(c) Homogeneous function of degree 0

(d) Not a homogeneous function

Ans. (a)

12. If $f(x,y) = x^3 \sin^{-1}\left(\frac{y^3}{x^3}\right) - \mathrm{xy}^2 \sin^{-1}\left(\frac{x}{y}\right)$, $x > 0, y > 0$ then

(a) $x\frac{\partial f}{\partial x} + y\frac{\partial f}{\partial y} = 2f$

(b) $x\frac{\partial f}{\partial x} + y\frac{\partial f}{\partial y} = 3f$

(c) $x\frac{\partial f}{\partial x} + y\frac{\partial f}{\partial y} = 2f + 3$

(d) 0

Ans. (b)

13. A vector field $\vec{v}$ is said to be conservative if there exist a

(a) a vector $\vec{f}$ such that $\vec{v} = curl\vec{f}$

(b) a vector $\vec{f}$ such that $\vec{v} = \nabla.\vec{f}$

(c) a scalar function f such that $\boldsymbol{\vec{v} = \nabla f}$

(d) None of these

Ans. (c)

14. Value of integral $\int_{-\infty}^{\infty} e^{-x^2}\, dx$

(a) $2\sqrt{\pi}$

(b) $\sqrt{\pi}$

(c) 1

(d) 0

Ans. (b)

15. Unit normal vector to the surface $x^2 + 2y^2 + z^2 = 4$ at the point $(1,1,1)$ is

(a) $\frac{x-1}{1} = \frac{y-1}{2} = \frac{z-1}{1}$

(b) $\frac{\hat{\imath}+2\hat{\jmath}+\hat{k}}{\sqrt{6}}$

(c) $2\left(\hat{\imath} + 2\hat{\jmath} + \hat{k}\right)$

(d) None of these

Ans. (b)

16. If u is a homogeneous function of x and y of degree n then

(a) only $\frac{\partial u}{\partial x}$ is homogeneous function of degree n

(b) only $\frac{\partial u}{\partial y}$ is homogeneous function of degree n

(c) both $\frac{\partial u}{\partial x}$ and $\frac{\partial u}{\partial y}$ are homogeneous function of degree n

(d) None of these

Ans. (d)

17. Function $u(x, y) = x^m y + x\, y^n + 2x^3$ satisfy Euler's theorem if

(a) $m = 1, n = 2$

(b) $m = 2, n = 2$

(c) $m = 1, n = 1$

(d) $u(x, y)$ never satisfy Euler's theorem for any value of m and n.

Ans. (b)

18. For which of the following function, Euler's theorem satisfy

(a) $\frac{x^2 - y^2}{x + y}$

(b) $x^n F\left(\frac{y}{x}\right)$

(c) $y^n F\left(\frac{x}{y}\right)$

(d) All of these

Ans. (d)

19. Stationary point of the function $f(x, y) = y^2 + (y - 2)x$ is

(a) (- 4, - 2)
(b) (- 4, 2)
(c) (4, - 2)
(d) None of these

Ans. (b)

20. A stationary point (a, b) will be point of minima if $rt - s^2 > 0$ and

(a) $r > 0$

(b) $r < 0$

(c) $r = 0$

(d) None of these

Ans. (a)

21. The gamma function $\lceil n, (n > 0)$ is defined as

(a) $\int_0^\infty e^x x^{n-1}\, dx$

(b) $\int_0^\infty e^{-x} x^{n-1}\, dx$

(c) $\int_0^\infty e^{-x} x^{n+1}\, dx$

(d) $\int_0^\infty e^x x^{n+1}\, dx$

Ans. (a)

22. The value of $\lceil\frac{3}{2}$ is

(a) π

(b) $\frac{\pi}{2}$

(c) $\frac{\sqrt{\pi}}{2}$

(d) $\sqrt{\pi}$

Ans. (c)

23. Gradient of the scalar field $x^3 - 3x^2y^2 + y^3$ at point (1, 2) is

(a) $21\hat{\imath}$

(b) $-21\hat{\imath}$

(c) $21\hat{\imath} - 21\hat{\jmath}$

(d) None of these

Ans. (b)

24. The value of the integral $\int_0^1 \frac{x}{(1+x)^{n+1}}\, dx$ is

(a) β(1, n)

(b) β(2, n)

(c) β(n, 2)

(d) β(3, n)

Ans. (a)

25. $\int_0^\infty e^{-x}x^3\, dx$ is equal to:

(a) Γ3

(b) 5!

(c) Γ4

(d) 4!

Ans. (c)

26. The value of $\int_1^0 \int_0^1 \frac{1}{\sqrt{(1-x^2)(1-y^2)}} dxdy$ is equal to

(a) $-\frac{\pi^2}{4}$

(b) $\frac{\pi^2}{4}$

(c) 1

(d) 0

Ans. (b)

27. The value of $curl(gradf)$, where $f = x^2 + 2xy^2 + 4z^2y$ is

(a) $2x + 2y^2 - 4xy - 4z^2 + 8zy$

(b) $(2x + 2y^2)\hat{\imath} - (4xy + 4z^2) + \hat{\jmath} + 8zy\hat{k}$

(c) 0

(d) 3

Ans. (c)

28. Curl of vector field $\hat{v} = 2i + j + 2k$ is given by

(a) $2xi + yj + 2zk$

(b) $2x + y + 2z$

(c) 0

(d) None of these

Ans. (c)

29. The value of λ so that the vector $(x + 3y)\hat{\imath} + (y - 2z)\hat{\jmath} + (x + \lambda z)\hat{k}$ is a solenoidal vector, is

(a) -2

(b) 3

(c) 1

(d) *none*

Ans. (a)

30. The vector $\vec{v} = e^x siny\, \hat{\imath} + e^x cosy\, \hat{\jmath}$, is

(a) solenoidal

(b) irrotational

(c) rotational

(d) none

Ans. (b)