Single Correct Answer Type:

1. The differential equation of all ellipses centered at the origin and axes along coordinate axes is

(A) $y^2 + xy_1^2 - yy_1 = 0$ (B) $xyy_2 + xy_1^2 - yy_1 = 0$

(C) $yy_2 + xy_1^2 - xy_1 = 0$ (D) $y_1^2 + yy_2 = 0$

2. The integral equation $x\int_0^x y(t)dt = (x+1)\int_0^x ty(t)dt \;\; x > 0$ reduces to differential equation

(A) $x^2\frac{dy}{dx} + (3x+1)y = 0$ (B) $x^2\frac{dy}{dx} + (3x-1)y = 0$

(C) $x\frac{dy}{dx} + (3x-1)y = 0$ (D) $x^2\frac{dy}{dx} + (x+1)y = 0$

3. General solutions of the differential equations $y = x\frac{dy}{dx} + \frac{dx}{dy}$ represent

(A) a straight line or a hyperbola (B) a straight line or a parabola
(C) a parabola or a hyperbola (D) a circle or a parabola

4. The general solution of $\left(1 + e^{\frac{x}{y}}\right)dx + e^{x/y}\left(1 - \frac{x}{y}\right)dy = 0$ is

(A) $x^{x/y} + y = C$ (B) $xe^{x/y} + y = C$ (C) $x + ye^{x/y} = C$ (D) $x + y = Ce^{-x/y}$

5. The general solution of differential equation $\frac{dy}{dx} + x\sin 2y = x^3\cos^2 y$ is

(A) $Tany = \frac{x^2-1}{2} + ce^{-x^2}$ (B) $Tany = \frac{x^2-1}{2} + ce^{x^2}$

(C) $Tany = e^{x^2} + c\left(x^2-1\right)$ (D) $Tan^{-1}\left(\frac{x^2-1}{2}\right) = ce^{-x^2}$

6. The differential equation whose general solution is given by $y = c_1\cos(x + c_2) - c_3e^{(c_4-x)} + c_5\sin x$, where c_1, c_2, c_3, c_4, c_5 are arbitrary constants, is

(A) $y_4 - y_2 + y = 0$ (B) $y_3 + y_2 + y_1 + y = 0$

(C) $y_5 + y = 0$ (D) $y_3 - y_2 + y_1 - y = 0$

7. The solutions of equation $\frac{dy}{dx} = \frac{x(2\log x + 1)}{\sin y + y\cos y}$ is

(A) $y\sin y = x^2\log x + \frac{x^2}{2} + c$ (B) $y\cos y = x^2(\log x + 1) + c$

(C) $y\cos y = x^2\log x + \frac{x^2}{2} + c$ (D) $y\sin y = x^2\log x + c$

8. The general solution of differential equation
$\frac{dy}{dx} + \sin\left(\frac{x+y}{2}\right) = \sin\left(\frac{x-y}{2}\right)$ is

(A) $\log\tan\frac{y}{2} = c - 2\sin x$ (B) $\log\tan\frac{y}{4} = c - 2\sin\frac{x}{2}$

(C) $\log\tan\left(\frac{y}{2} + \frac{\pi}{4}\right) = c - 2\sin x$ (D) $\log\tan\left(\frac{y}{4} + \frac{\pi}{4}\right) = c - 2\sin\frac{x}{2}$

9. The solution of differential equation $\cos^2 x\frac{dy}{dx}-(\tan 2x)y=\cos^4 x, |x|<\frac{\pi}{4}$, where $y\left(\frac{\pi}{6}\right)=\frac{3\sqrt{3}}{8}$ is

(A) $y=\tan 2x\cos^2 x$ (B) $y=\cot 2x\cos^2 x$ (C) $2y=\tan 2x\cos^2 x$ (D) $2y=\cot 2x\cos^2 x$

10. The solutions of the differential equation $\frac{dy}{dx}=\frac{1}{xy\left(x^2\sin y^2+1\right)}$ is (c is arbitrary constant)

(A) $x^2\left(\cos y^2-\sin y^2-2ce^{-y^2}\right)=2$ (B) $y^2\left(\cos x^2-\sin y^2-2ce^{-y^2}\right)=2$

(C) $x^2\left(\cos y^2-\sin y^2-e^{-y^2}\right)=4c$ (D) $x^2\left(\cos y^2+\sin y^2-2ce^{-y^2}\right)=2$

11. Solution of differential equation $\left(\frac{1}{x}-\frac{y^2}{(x-y)^2}\right)dx+\left(\frac{x^2}{(x-y)^2}-\frac{1}{y}\right)dy=0$ is

(A) $\ln\left|\frac{x}{y}\right|+\frac{xy}{x-y}=c$ (B) $\frac{xy}{x-y}=ce^{\frac{x}{y}}$ (C) $(\ln|xy|=c+\frac{xy}{x-y}$ (D) $\ln\left|\frac{x}{y}\right|+\frac{x-y}{xy}=c$

12. The solutions of differential equation $\frac{dy}{dx}=\frac{3x^2y^4+2xy}{x^2-2x^3y^3}$ is

(A) $\frac{y^2}{x}-x^3y^2=c$ (B) $\frac{y^2}{x}+x^3y^3=c$ (C) $\frac{x^2}{y}+x^3y^2=c$ (D) $\frac{x^2}{3y}-2x^3y^2=c$

13. Orthogonal trajectories of family of the curve $x^{\frac{2}{3}}+y^{\frac{2}{3}}=a^{\frac{2}{3}}$ where a, arbitrary constant, is

(A) $x^{\frac{2}{3}}-y^{\frac{2}{3}}=c$ (B) $x^{\frac{4}{3}}-y^{\frac{4}{3}}=c$ (C) $x^{\frac{4}{3}}+y^{\frac{4}{3}}=c$ (D) $x^{\frac{1}{3}}-y^{\frac{1}{3}}=c$

14. The differential equation of all non horizontal lines in a plane is

(A) $\frac{d^2y}{dx^2}=0$ (B) $\frac{d^2x}{dy^2}=0$ (C) $\frac{dy}{dx}=0$ (D) $\frac{dx}{dy}=0$

15. If $f(x)$ be positive, continuous and differentiable an (a,b). If $\lim\limits_{x\to a^+}f(x)=1$ and $\lim\limits_{x\to b^-}f(x)=3^{1/4}$

And $f'(x)\ge f^3(x)+\frac{1}{f(x)}$ then

(A) $b-a\ge\frac{\pi}{4}$ (B) $b-a\le\frac{\pi}{4}$ (C) $b-a\le\frac{\pi}{24}$ (D) $b-a\ge\frac{\pi}{24}$

16. The population of a country increased at a rate proportional to the number of in habitants. If the population which doubles in 30 years, then the population will triple in approximately.

(A) 30 years (B) 45 years (C) 48 years (D) 54 years

17. A curve passing through $(2,3)$ and satisfying the differential equation $\int_0^x ty(t)dt=x^2y(x), x>0$, is

(A) $x^2+y^2=13$ (B) $y^2=\frac{9x}{2}$ (C) $\frac{x^2}{8}+\frac{y^2}{18}=1$ (D) $xy=6$

18. A spherical rain drop evaporates at a rate proportional to its surface area at any instant t. The differential equation giving the rates of change of the radius of the rain drop is

(A) $\frac{d^2r}{dt^2}+2r=0$ (B) $\frac{d^2r}{dt^2}-3r=0$ (C) $\frac{d^2r}{dt^2}=0$ (D) none

19. Solution of D.E. $\left(e^{x^2}+e^{y^2}\right)y\frac{dy}{dx}+e^{x^2}\left(xy^2-x\right)=0$ is

(A) $e^{x^2}\left(y^2-1\right)+e^{y^2}=c$ (B) $e^{y^2}\left(x^2-1\right)+e^{x^2}=c$

(C) $e^{y^2}\left(y^2-1\right)+e^{x^2}=c$ (D) $e^{x^2}(y-1)+e^{y^2}=c$

20. If $\phi(x)=\int_0^x(\phi(t))^{-2}\,dt$ and $\phi(1)=0$ then $\phi(x)$ is

(A) $(2(x-1))^{1/4}$ (B) $(5(x-2))^{1/5}$ (C) $(3(x-1))^{1/3}$ (D) $(x-1)^{\frac{1}{3}}x^2$

Numerical Based:

21. The degree and order of the differential equation of all parabolas whose axis is x-axis are a and b then $a+b=$

22. The equation of curve whose slope at any point (x, y) is $\frac{y}{x^2}$ and passing through (2, 1) is then $y(2\log_{e/144}e)=$

23. A differential equation associated to $y=a+be^{5x}+ce^{-7x}$ where a, b, c are parameters and if y_n denotes n^{th} derivative of y with respect to x is $Ay_3+By_2-Cy_1=0$ then $A-B+C=34$

24. If the solution of $x^2y-x^3\frac{dy}{dx}=y^4\cos x$ is $\frac{x^3}{y^3}=3f(x)+c(f(0)=0)$ then $\left(\frac{f(\pi/3)}{f(\pi/6)}\right)^2$ = __

25. The degree of the differential equation by the curve $\sqrt{1+x}=1+\alpha\sqrt{1+y}$ is

KEY

1.	B	**2.**	B	**3.**	B	**4.**	C	**5.**	A
6.	B	**7.**	D	**8.**	B	**9.**	C	**10.**	A
11.	A	**12.**	C	**13.**	B	**14.**	B	**15.**	C
16.	C	**17.**	D	**18.**	C	**19.**	A	**20.**	C
21.	3	**22.**	12	**23.**	34	**24.**	3	**25.**	1

❇ *Wish You esf all the Best* ❇