MATHEMATICS CLASS TEST

TIME: 1.5 HR **MM: 100**

This paper contains 25 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct. **MARKING: (+4, –1, 0)**

1. The order and degree of the differential equation $\left(1+3\frac{dy}{dx}\right)^{2/3}=4\frac{d^3y}{dx^3}$ are:
   (a) $\left(1,\frac{2}{3}\right)$ (b) $(3,1)$
   (c) $(3,3)$ (d) $(1,2)$

2. The solution of the equation $\frac{d^2y}{dx^2}=e^{-2x}$ is:
   (a) $\frac{e^{-2x}}{4}$ (b) $\frac{e^{-2x}}{4}+cx+d$
   (c) $\frac{1}{4}e^{-2x}+cx^2+d$ (d) $\frac{1}{4}e^{-2x}+c+d$

3. The differential equation of all non-vertical lines in a plane is:
   (a) $\frac{d^2y}{dx^2}=0$ (b) $\frac{d^2x}{dy^2}=0$
   (c) $\frac{dy}{dx}=0$ (b) $\frac{dx}{dy}=0$

4. The degree and order of the differential equation of the family of all parabolas whose axis is x-axis, are respectively:
   (a) 1, 1 (b) 1, 2
   (c) 3, 2 (d) 2, 3

5. The solution of the differential equation $\left(1+y^2\right)+\left(x-e^{\tan^{-1}y}\right)\frac{dy}{dx}=0$, is:
   (a) $(x-2)=ke^{-\tan^{-1}y}$
   (b) $2xe^{\tan^{-1}y}=e^{2\tan^{-1}y}+k$
   (c) $xe^{\tan^{-1}y}=\tan^{-1}y+k$
   (d) $xe^{2\tan^{-1}y}=e^{\tan^{-1}y}+k$

6. function $y=f(x)$ has a second order derivative $f^{//}(x)=6(x-1)$. If its graph passes through the point $(2,1)$ and at that point the tangent to the graph is $y=3x-5$, then the function is:
   (a) $(x-1)^2$ (b) $(x-1)^3$
   (c) $(x+1)^3$ (d) $(x+1)^2$

7. The differential equation for the family of curves $x^2+y^2-2ay=0$, where a is an arbitrary constant is:
   (a) $2\left(x^2-y^2\right)y^/=xy$ (b) $2\left(x^2+y^2\right)y^/=xy$
   (c) $\left(x^2-y^2\right)y^/=2xy$ (d) $\left(x^2+y^2\right)y^/=2xy$

8. The solution of the differential equation $ydx+\left(x+x^2y\right)dy=0$ is:
   (a) $-\frac{1}{xy}=C$ (b) $-\frac{1}{xy}+\log y=C$
   (c) $\frac{1}{xy}+\log y=C$ (d) $\log y=Cx$

9. The differential equation representing the family of curves $y^2=2c\left(x+\sqrt{c}\right)$, where $c>0$, is a parameter, is of order and degree as follows:
   (a) order 1, degree 3 (b) order 2, degree 2
   (c) order 1, degree 2 (d) order 1, degree 1

10. If $x\frac{dy}{dx}=y(\log y-\log x+1)$, then the solution of the equation is
    (a) $\log\left(\frac{y}{x}\right)=cx$ (b) $\log\left(\frac{x}{y}\right)=cy$
    (c) $y\log\left(\frac{x}{y}\right)=cx$ (d) $x\log\left(\frac{y}{x}\right)=cy$

11. The differential equation whose solution is $Ax^2+By^2=1$, where A and B are arbitrary constants is of
    (a) second order and first degree
    (b) second order and second degree
    (c) first order and second degree
    (d) first order and first degree

12. The differential equation of all circles passing through the origin and having their centers on the x-axis is
    (a) $x^2=y^2+xy\frac{dy}{dx}$
    (b) $x^2=y^2+3xy\frac{dy}{dx}$
    (c) $y^2=x^2+2xy\frac{dy}{dx}$
    (d) $y^2=x^2-2xy\frac{dy}{dx}$

13. The normal to a curve at $P(x, y)$ meets the x-axis at G. If the distance of G from the origin is twice the abscissa of P, then the curve is
(a) an ellipse (b) a parabola
(c) a circle (d) a hyperbola

14. The solution of the differential equation $\frac{dy}{dx} = \frac{x+y}{x}$ satisfying the condition $y(1) = 1$ is
(a) $y = \ln x + x$ (b) $y = x \ln x + x^2$
(c) $y = xe^{(x-1)}$ (d) $y = x \ln x + x$

15. The differential equation of the family of circles with fixed radius 5 units and center on the line $y = 2$ is
(a) $(x-2)y'^2 = 25 - (y-2)^2$
(b) $(y-2)y'^2 = 25 - (y-2)^2$
(c) $(y-2)^2 y'^2 = 25 - (y-2)^2$
(d) $(x-2)^2 y'^2 = 25 - (y-2)^2$

16. he differential equation which represents the family of curves $y = c_1 e^{c_2 x}$, where c_1 and c_2 are arbitrary constants, is
(a) $y' = y^2$ (b) $y'' = y' y$
(c) $yy'' = y'$ (d) $yy'' = (y')^2$

17. Solution of the differential equation $\cos x dy = y(\sin x - y)dx,\ 0 < x < \frac{\pi}{2}$ is
(a) $\sec x = (\tan x + c)y$ (b) $y \sec x = \tan x + c$
(c) $y \tan x = \sec x + c$ (d) $\tan x = (\sec x + c)y$

18. Let I be the purchase value of an equipment and V(t) be the value after it has been used for t years. The value V(t) depreciates at a rate given by differential equation $\frac{dV(t)}{dt} = -k(T-t)$, where $k > 0$ is a constant and T is the total life in years of the equipment. Then the scrap value V(T) of the equipment is:
(a) $T^2 - \frac{1}{k}$ (b) $I - \frac{kT^2}{2}$
(c) $I - \frac{k(T-t)^2}{2}$ (d) e^{-kT}

19. If $\frac{dy}{dx} = y + 3 > 0$ & $y(0) = 2$ then y(ln2) is equal to :
(a) 7 (b) 5
(c) 13 (d) –2

20. The solution of the differential equation $(x^2 - y^2)\,dx + 2xy\,dy = 0$ is-
(a) $x^2 + y^2 = cx$ (b) $x^2 - y^2 + cx = 0$
(c) $x^2 + 2xy = y^2 + cx$ (d) $x^2 + y^2 = 2xy + cx^2$

21. The differential equation, which represents the family of plane curves $y = e^{cx}$, is-
(a) $y' = cy$
(b) $xy' - \log y = 0$
(c) $x \log y = yy'$
(d) $y \log y = xy'$

22. The degree and order of the differential equation of the family of all parabolas whose axis is x - axis, are respectively-
(a) 2, 3 (b) 2, 1
(c) 1, 2 (d) 3, 2

23. The differential equation for the family of curves $x^2 + y^2 - 2ay = 0$, where a is an arbitrary constant is-
(a) $2(x^2 - y^2)\, y' = xy$
(b) $2(x^2 + y^2)\, y' = xy$
(c) $(x^2 - y^2)\, y' = 2xy$
(d) $(x^2 + y^2)\, y' = 2xy$

24. The differential equation of all circles passing through the origin and having their centres on the x-axis is-
(a) $x^2 = y^2 + xy\frac{dy}{dx}$ (b) $x^2 = y^2 + 3xy\frac{dy}{dx}$
(c) $y^2 = x^2 + 2xy\frac{dy}{dx}$ (d) $y^2 = x^2 - 2xy\frac{dy}{dx}$

25. If $y' = y + 1$ and $y(0) = 1$, then value (s) of $y(\ell n\ 2)$.
(a) 2 (b) 3
(c) 4 (d) 5