CHRIST (DEEMED TO BE UNIVERSITY),BENGALURU - 560029

End Semester Examination March - 2018

Bachelor of Science II SEMESTER

Code: MAT231 **Max.Marks: 100**

Subject: DIFFERENTIAL EQUATIONS **Duration: 3Hrs**

SECTION A

Answer any EIGHT questions **8X3=24**

1 Solve $\frac{dy}{dx} + x^2 = x^2 e^{3x}$.

2 Solve $\frac{dy}{dx} + 1 = e^{(x+y)}$.

3 Solve $(x^2 - ay)dx + (y^2 - ax)dy = 0$.

4 Find the general and singular solution of $sin(px - y) = p$.

5 Determine the general solution of the ODE $(D^2 - 6D + 25)y = 0$.

6 Find the complementary function of the differential equation $x^2 \frac{d^2y}{dx^2} + 2x\frac{dy}{dx} - 2y = x^3$.

7 Solve the simultaneous equations $\frac{dx}{dt} + 2x - 3y = 0$ and $\frac{dy}{dt} - 3x + 2y = 0$.

8 Test for exactness and if exact, find the first integral for $(1 + x + x^2)\frac{d^2y}{dx^2} + (2 + 4x)\frac{dy}{dx} + 2y = x$

9 Form the PDE corresponding to $z = axy + b$.

10 Solve the PDE $(1 + y)p + (1 + x)q = z$.

11 Solve the PDE $yp = 2xy + logq$.

12 Solve the PDE $\sqrt{p} + \sqrt{q} = 1$.

SECTION B

Answer Any SEVEN Questions **7X8=56**

13 Solve $(y^2 + 2xy)dx + (2x^2 + 3xy)dy = 0$.

14 Solve $x\frac{dy}{dx} + ylogy = xye^x$

15 Find the orthogonal trajectories of the family of curves $\frac{x^2}{a^2} + \frac{y^2}{\lambda + a^2} = 1$, where λ is a parameter.

16 Solve $(D^3 + 3D^2 - 4)y = xe^{-2x}$.

17 Solve $\frac{d^2y}{dx^2} + cotx\frac{dy}{dx} - (cosec^2 x)y = 0$,given that $cotx$ is a part of complementary function.

18 Solve $\frac{d^2y}{dx^2} - \frac{2}{x}\frac{dy}{dx} + \left(1 + \frac{2}{x^2}\right)y = xe^x (x > 0)$ by changing the dependent variable.

19 Obtain the PDE corresponding to the relation $\phi(xyx, x^2 + y^2 + z^2) = 0$ and express it in the form $Pp + Qq = R$.

20 Solve the PDE $(x^2 - y^2 - yz)p + (x^2 - y^2 - zx)q = z(x - y)$.

21 Solve the PDE $p^3 + q^3 = 3pqz$.

SECTION C

Answer any TWO **2X10=20**

22 Solve $\frac{dy}{dx} = \frac{x+y+4}{x-y-6}$

23 Solve $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} - y = x^2 logx$ by the method of variation of parameters.

24 Using Charpit's method solve: $2z + p^2 + qy + 2y^2 = 0.$