CHRIST (DEEMED TO BE UNIVERSITY),BENGALURU - 560029

End Semester Examination March/April - 2019

Bachelor of Science (CME/CMS/EMS/PCM/PME) II SEMESTER

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

Course: DIFFERENTIAL EQUATIONS **Duration: 3Hrs**

SECTION A

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

1 Solve $(x^2y - x^2)dx + (xy^2 - y^2)dy = 0.$

2 Solve: $\frac{dy}{dx} = \frac{6x - 3y + 7}{2x - y + 4}.$

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

4 Find the general and singular solution of $y = px + p - p^2.$

5 Determine the general solution of the ODE $(D^3 + 8)y = 0.$

6 Solve: $\frac{dx}{yz} = \frac{dy}{zx} = \frac{dz}{yz}.$

7 Solve the simultaneous equations $\frac{dx}{dt} + 4x + 3y = 0$ and $\frac{dy}{dt} + 2x + 5y = 0.$

8 Test for exactness and if exact, find the first integral for

$x(2x + 3)\frac{d^2y}{dx^2} + 3(2x + 1)\frac{dy}{dx} + 2y = (x + 1)e^x.$

9 Form the PDE corresponding to $z = (x^2 + a)(y^2 + b).$

10 Solve the PDE $p^2 + q^2 = x + y.$

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

12 Solve the PDE $p + q + pq = 0.$

SECTION B

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

13 Solve $[xcos(y/x) + ysin(y/x)]\,y - [ysin(y/x) - xcos(y/x)]\,x\frac{dy}{dx} = 0.$

14 Solve $\frac{dy}{dx} + \frac{1}{x}sin2y = x^3cos^2y$

15 Show that the family of parabolas $x^2 = 4a(y + a)$ is self-orthogonal, where a is a parameter.

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

17 Solve $x\frac{d^2y}{dx^2} - (2x - 1)\frac{dy}{dx} + (x - 1)y = 0(x > 0)$, given that e^x is a part of complementary function.

18 Solve $x^2\frac{d^2y}{dx^2} - 2x(x + 1)\frac{dy}{dx} + 2(x + 1)y = x^3(x > 0).$ by changing the dependent variable.

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

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

21 Solve the PDE $z^2(p^2 + q^2 + 1) = 1.$

SECTION C

Answer any TWO **2X10=20**

22 Solve $\frac{dy}{dx} + \frac{x - y - 2}{x - 2y - 3} = 0.$

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

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