BSc DEGREE (CBCS) EXAMINATION, OCTOBER 2019

Fifth Semester

Core Course - MM5CRT02 - DIFFERENTIAL EQUATIONS

(Common to B.Sc Computer Applications Model III Triple Main ,B.Sc Mathematics Model I,B.Sc Mathematics Model II Computer Science)

2017 Admission Onwards

86251D8E

Maximum Marks: 80   Time: 3 Hours

Part A

*Answer any **ten** questions.*

*Each question carries **2** marks.*

1. Solve the differential equation $x^5 y' + y^5 = 0$

2. Find the orthogonal trajectory of $x - y^2 = c$

3. Find the integrating factor of $(2x + tany)dx + (x - x^2 tany)dy = 0$

4. Write Euler"s equidimensional equation

5. Find the general solution of the differential equation $y^{(4)} - 5y^{(2)} + 4y = 0$

6. Find the general solution of the differential equation $y^{(4)} - 8y^{(2)} + 16y = 0$

7. Find the differential equation of the general solution A e^{-x} +B e^{-4x}

8. Define sum and difference of two power series.

9. Define an ordinary point of a differential equation.

10. Find P', Q' and R' so that *PP'+QQ'+RR'=0* if $P = yz(b - a), Q = zx(c - a), R = xy(a - b)$ and verify it.

11. Generate a partial differential equation by eliminating the arbitrary function f from $f(x^2 + y^2 + z^2, z^2 - 2xy) = 0.$

12. Give a general definition for partial differential equation.

$(10 \times 2 = 20)$

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. Find the particular solution of the differential equation $y' = xe^x, y = 3$ when $x = 1$

14. Solve the initial value problem $x^2 y' + xy = 2x$, $y(1) = 1$

15. Show that the differential equation $(y\cos x + 2xe^y) + (\sin x + x^2 e^y - 1)y' = 0$ is exact and find its solution.

16. Solve the differential equation $y'' + k^2 y = 0$ where k is an unknown real constant.

17. Find the general solution of $y^{11} + y = \sin x$

18. Find $y_2(x)$ when $y_1(x) = e^{2x}$ solution of the differential equation $y^{11} - 4y^1 + 4y = 0$

19. Find a power series solution of the differential equation $y' + y = 0$.

20. Define exponents of a differential equation at a regular singular point .
    Prove that 0 is a regular singular point of the differential equation $xy'' + 2y' + xy = 0$ and then find the exponents for 0.

21. Find the general solution of $(\frac{b-c}{a})yzp + (\frac{c-a}{b})zxq = (\frac{a-b}{c})xy$

$(6\times5=30)$

Part C

*Answer any **two** questions.*

*Each question carries **15** marks.*

22. i)Solve $(5x + 2y + 1)dx + (2x + y + 1)dy = 0$
    ii)Solve $\frac{dy}{dx} = \frac{x\tan(y/x) + y}{x}$

23. Find the particular solution of $y^{11} - y^1 - 6y = e^{-x}$ first by undetermined coefficient and then by variation of parameters

24. Locate and classify singular points on the X-axis for the differential equations:
    a) $x^3(x - 1)y'' - 2(x - 1)y' + 3xy = 0$
    b) $x^2(x^2 - 1)y'' - x(1 - x)y' + 2y = 0$
    c) $x^2(x^2 - 1)^2 y'' - x(1 - x)y' + 2y = 0$

25. Find the equation of the integral surface of the differential equation $x^2 p + y^2 q + z^2 = 0$ which passes through the hyperbola $xy = x + y, z = 1$.

$(2\times15=30)$