

**C. ABDUL HAKEEM COLLEGE (AUTONOMOUS),**  
**MELVISHARAM - 632 509.**

**SEMESTER EXAMINATIONS, NOVEMBER - 2018**

**B.Sc., MATHEMATICS**

**U15MMA301 / U14MMA301 – DIFFERENTIAL EQUATIONS**

Time: Three Hours

Maximum: 75 Marks

SECTION - A (10 X 2 = 20 Marks)

Answer ALL Questions.

1. Solve  $p^2 - 5p + 6 = 0$  where  $p = \frac{dy}{dx}$ .

2. Write necessary and sufficient condition for a differential equation of first order and first degree to be exact.

3. Find the complementary function of  $y_2 - 3y_1 + 2y = e^x / (1 + e^x)$ .

4. Find the Wronskian of the solutions of  $y_2 + a^2 y = 0$ .

5. Solve  $\frac{x \frac{dx}{dz}}{y^2 z} = \frac{dy}{xz} = \frac{dz}{y^2}$ .

6. Define total differential equation.

7. Evaluate  $L[\sin 2t \cos 3t]$ .

8. Evaluate  $L^{-1}\left[\frac{1}{s^2 + 25}\right]$ .

9. Eliminate arbitrary constant from  $z = (x+a)(y+b)$ .

10. Solve  $p+q=x+y$ .

SECTION - B (5 X 5 = 25 Marks)

Answer ALL Questions.

11. a) Solve  $\{y(1+1/x) + \cos y\} dx + (x+\log x - x \sin y) dy = 0$ .

(Or)

b) Solve  $y = (x-a)p - p^2$ .

12. a) Apply the method of variation of parameters to solve  $y_2 + n^2 y = \sec nx$ .  
 (Or)

- b) Apply the method of variation of parameters to solve  $y_2 - y = 2/(1 + e^x)$ .

13. a) Solve  $y \frac{d^2 y}{dx^2} - \left(\frac{dy}{dx}\right)^2 = y^2 \log y$ .  
 (Or)
- b) Solve  $(yz + 2x)dx + (zx - 2z)dy + (xy - 2y)dz = 0$ .

14. a) Find  $L^{-1}\left[\frac{1}{s^2 - 5s + 6}\right]$ .

(Or)

- b) Solve using laplace the following differential equation

$$\frac{d^2 y}{dt^2} + 25 y = 10 \cos 5t. \text{ Given } y(0) = 2 \text{ and } y'(0) = 0.$$

15. a) Solve  $p^2 + q^2 = 4$  where  $p = \frac{\partial z}{\partial x}; q = \frac{\partial z}{\partial x}$ .

(Or)

- b) Find the singular solution  $z = px + qy + \sqrt{1 + p^2 + q^2}$ .

SECTION - C (3 X 10 = 30 Marks)

Answer ANY THREE Questions.

16. Solve  $x dx + y dy = \frac{a^2(x dx - y dy)}{x^2 + y^2}$ .

17. Using method of variation of parameters, solve  $y_2 - 2y_1 + y = x e^x \sin x$  with

$$y(0) = 0 \text{ and } y'(0) = 0.$$

18. Solve  $(y^2 + yz + z^2) dx + (z^2 + zx + x^2) dy + (x^2 + xy + y^2) dz = 0$ .

19. Solve  $\frac{dx}{dt} + 2x - 3y = 0; \frac{dy}{dt} - 3x + 2y = 0$ . Given  $x(0) = 0; y(0) = 2$ .

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

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