



KT-5267

Seat No. \_\_\_\_\_

**B. Sc. (Sem. V) Examination**

November / December - 2014

**Mathematics : MATH-503**

Time : 3 Hours]

[Total Marks : 70

- 1 (a) Prove that  $\frac{1}{f(D)}(e^{ax} \cdot V) = e^{ax} \cdot \frac{1}{f(D+a)} \cdot V$  6  
 where  $a = \text{constant}$ ,  $V = \text{function of } x$ .
- (b) Solve :  $(D^5 - 13D^3 + 26D^2 + 82D + 104)y = 0$  6
- (c) Solve :  $(D^4 + 2D^3 - 3D^2)y = x^2 + 3e^{2x} + 4\sin x$  6

OR

- 1 (a) Prove that  $\frac{1}{D^2 + a^2} \cos ax = \frac{x}{2a} \sin ax$ . 6
- (b) Solve :  $(D^2 + 2)y = x^2 \cdot e^{3x}$  6
- (c) Solve :  $(D^4 + D^3 + D^2)y = x^2(a + bx)$  6
- 2 (a) Obtain the first integral of 6  
 $xy^{(3)} + (x^2 + x + 3)y^{(2)} + (4x + 2)y^{(1)} + 2y = 0$
- (b) Solve :  $y^{(3)} = \cos^2 x$  6
- (c) Solve :  $ax(a^2 - x^2)y^{(2)} - a^3y^{(1)} = x^3$  6

OR

- 2 (a) Find the first integral of 6  

$$y + 3xy_1 + 2yy_1^3 + (x^2 + 2y^2y_1)y_2 = 0$$
- (b) Solve :  $\{y^{(2)}\}^2 = 1 + \{y^{(1)}\}^2$  6
- (c) Solve :  $c^3 y^{(3)} = y^{(1)} \left[ 1 + \{y^{(1)}\}^2 \right]^2$  6
- 3 (a) Solve :  $y^{(2)} - \cot x \cdot y^{(1)} - (1 - \cot x)y = e^x \sin x$  6
- (b) Solve :  $y^{(2)} - 2 \tan x \cdot y^{(1)} - 5y = 0$  6  
 (By using normal form)
- (c) Solve :  $xy^{(2)} + (x-2)y^{(1)} - 2y = x^3$  6  
 (By factorization of operative method)

**OR**

- 3 (a) Solve :  $(x \sin x + \cos x)y^{(2)} - x \cos x \cdot y' + y \cos x = x$  6
- (b) Solve :  $y^{(2)} + y = \operatorname{cosec} x$  6  
 (By variation of parameter method)
- (c) Solve :  $y^{(2)} + y^{(1)} - 2y = -2e^{-x} - 5 \cos x$  6  
 (By method of undetermined coefficients)

4 Solve any **four** : 16

(1)  $\left[ D^2 - 2\lambda D + (\lambda^2 + \mu^2) \right] y = 0$

(2)  $(D - a)^n y = e^{ax}$

(3)  $x^2 \cdot y^{(4)} + 1 = 0$

$$(4) \quad a^2 \cdot y^{(4)} = y^{(2)}$$

$$(5) \quad y^{(2)} + \tan x \cdot y^{(1)} + \cos^2 x \cdot y = 0$$

(By changing the independent variable)

$$(6) \quad x^2 y^{(2)} + xy^{(1)} - y = x^2 \cdot e^x$$

where the integral in C.F. are  $y = x$  and

$y = \frac{1}{x}$ . (By variation of parameter method).

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