2023

## Unit 4: Partial Differential Equations and Special Functions **Question Bank**

1. Solve: 
$$(D^2 - DD' - 2D'^2 + 2D + 2D')z = e^{2x+3y} + \sin(2x+y) + xy$$
.  
Ans:  $\mathbf{z} = f_1(x-y) + e^y f_2(2x+y) - \frac{1}{10}e^{2x+3y} - \frac{1}{6}\cos(2x+y) + \frac{x}{24}(6xy - 6y + 9x - 2x^2 - 12)$ 

2. Solve: 
$$(D^2 - D'^2 + D - D')z = e^{2x+3y}$$
  
Ans:  $\mathbf{z} = f_1(y+x) + e^{-x}f_2(y-x) - \frac{1}{6}e^{2x+3y}$ 

3. Solve: 
$$(D - D' - 1)(D - D' - 2)z = \sin(2x + 3y)$$

Ans: 
$$z = e^x f_1(y+x) + e^{2x} f_2(y+x) + \frac{1}{10} [sin(2x+3y) - 3cos(2x+3y)]$$

4. Solve: 
$$(DD' + D - D' - 1)z = xy$$
  
Ans:  $z = f_1(y) + e^{-x}f_2(y + x) + x$