(c) Reduce the equation: $u_x+xu_y=y$ to canonical form, and obtain the general solution. 6.5

6. (a) Solve the initial-value problem:

$au_x+bu_y=0$, $u(x,0)=\alpha e^{\beta x}$ by the font is different. 6

(b) Reduce the: $u_{tt}-c^2u_{xx}=0, c\neq 0$ where c is a constant, into canonical form and hence find the general solution. 6

(c) Reduce the following partial differential equation with constant coefficients,

$u_{xx}+2u_{xy}+u_{yy}=0$

into canonical form and hence find the general solution. 6

11/12/17 (B)

[This question paper contains 4 printed pages]

Your Roll No. : .....

Sl. No. of Q. Paper : **7467** **HC**

Unique Paper Code : 32355301

Name of the Course : **Generic Elective for Honours : Mathematics**

Name of the Paper : Differential Equations

Semester : III

Time : 3 Hours ***Maximum Marks : 75***

Instructions for Candidates :

(a) Write your Roll No. on the top immediately on receipt of this question paper.

(b) Attempt **all** questions by selecting any **two** parts from each question.

1. (a) Solve the differential equation by finding an integrating factor:

$(e^{(x+y)}+ye^y)dx+(xe^y-1)dy=0$ 6.5

(b) Solve the differential equation $y''=5.7y-6.5y^2$. 6.5

(c) Find the orthogonal trajectories of $x=c\sqrt{y}$.

P.T.O.

2. (a) Solve $((3x^2+2x+\sin(x+y))dx+\sin(x+y)dy=0$. 6

(b) Show that x^2 and x^{-2} form a basis of the following differential equation $x^2y''+xy'-4y=0$. Also find the solution that satisfies the conditions $y(1)=11$, $y'(1)=-6$. 6

(c) Find the radius of convergence of the series $\sum_{m=0}^{\infty}\frac{(-1)^m x^{3m}}{8^m}$ 6

3. (a) Find the general solution of the following differential equation using method of variation of parameters $y''+9y=\sec 3x$. 6.5

(b) Use the method of undetermined coefficients to find the solution of the differential equation: $y''+3y'+2.25y=-10\,e^{-1.5x}$, $y(0)=1, y'(0)=0$. 6.5

(c) Find a homogenous linear ordinary differential equation for which two functions x^{-3} and $x^{-3}\ln x$ $(x>0)$ are solutions. Also show the linear independence by considering their Wronskian. 6.5

4. (a) Find the general solution of the linear partial differential equation

$x(y^2-z^2)u_x+y(z^2-x^2)u_y+z(x^2-y^2)u_z=0$. 6

(b) Find the general solution of the differential equation: $(x^2D^2+6xD+6I)y=0$.

Where $D=\frac{d}{dx}$ 6

(c) Find the particular solution of the linear system that satisfies the stated initial conditions:

$\frac{dy_1}{dt}=y_1+y_2,\quad y_1(0)=1$

$\frac{dy_2}{dt}=4y_1+y_2,\quad y_2(0)=6$. 6

5. (a) Find the power series solution of the following differential equation, in powers of x

$y''-y'=0$. 6.5

(b) Find the solution of the Cauchy problem: $xu_x+yu_y=xe^{-u}$, with the $u=0$ when $y=x^2$. 6.5