



Mahakal Institute of Technology, Ujjain

Department of Mathematics

PYQ's Unit -II

Q.N.	Question	Marks	RBT Level	CO
Q.1.	Solve $\frac{d^2y}{dx^2} - \cot x \frac{dy}{dx} (1 - \cot x)y = e^x \sin x$	5	L3, L4	CO2
Q.2.	Solve $x^2 (\frac{d^2y}{dx^2}) + x \frac{dy}{dx} - y = 0$ given that $x + 1/x$ is one integral.	5	L3, L4	CO2
Q.3	solve $(1 - x^2) \frac{d^2y}{dx^2} + x \frac{dy}{dx} - y = x(1-x^2)^{3/2}$	5	L3, L4	CO2
Q.4.	Solve the differential equation by removal of first derivative method (By reducing it to normal form), $\frac{d^2y}{dx^2} - 2 \tan x \frac{dy}{dx} + 5y = \sec x \cdot e^x$	5	L3, L4	CO2
Q.5.	Solve $(\frac{d^2y}{dx^2}) + 2x \frac{dy}{dx} + (x^2 + 1)y = x^3 + 3x$ by changing it in normal form.	5	L3, L4	CO2
Q.6.	Solve by method of variation of parameters, $\frac{d^2y}{dx^2} + 9y = \tan 3x$ or $(D^2 + 9)y = \tan 3x$	5	L3, L4	CO2
Q.7	Solve by method of variation of parameters, $\frac{d^2y}{dx^2} + y = \tan x$			
Q.8	Solve by method of variation of parameters, $\frac{d^2y}{dx^2} + 4y = \tan 2x$	Q.6	Q.6	Q.6
Q.9	Solve by method of variation of parameters, $\frac{d^2y}{dx^2} + a^2y = \tan ax$			

Q.11 Solve $\frac{d^2y}{dx^2} - y = 0$ in series.

5

L3, L5

CO²

Solve $(1-x^2) \frac{d^2y}{dx^2} + 2x \frac{dy}{dx} + y = 0$ in series.

5

L3, L5

CO²

Q.12 Solve by power series method,

$$(1+x^2) \frac{d^2y}{dx^2} + x \frac{dy}{dx} - y = 0$$

or

5

L3, L5

CO²

Solve in series the equation $(1+x^2) \frac{d^2y}{dx^2} + x \frac{dy}{dx} - y = 0$ about the point $x = 0$.

Q.13 Solve by using Frobenius method,

$$x(1-x) \frac{d^2y}{dx^2} + 2(1-2x) \frac{dy}{dx} - 2y = 0$$

5

L3, L5

CO²

Q.14 Show that

(i)

$$J_{1/2}(x) = \sqrt{\frac{2}{\pi x}} \sin x$$

5

L3, L5

CO²

(ii)

$J_n(-x) = (-1)^n J_n(x)$ when n is a positive or negative integer.