

Accurate College of Engineering & Technology, Greater Noida

B. Tech. I Year Even Sem. 2023-24

Assignment - I

Mathematics - II (BAS203)

Q.1 Solve the differential equation: $\frac{d^2y}{dx^2} - 7\frac{dy}{dx} + 12y = 0$.

Q.2 Find the Solution of the differential equation: $\frac{d^2y}{dx^2} + 9y = 0$.

Q.3 Solve: $(D^6 - D^4)y = 0$.

Q.4 Solve: $(2D - 1)^3y = 0$.

Q.5 Solve: $(D^2 + 1)^2(D - 1)y = 0$.

Q.6 For a differential Equation $\frac{d^2y}{dx^2} + 2\alpha\frac{dy}{dx} + y = 0$, find the value of α for which the differential Equation characteristic has equal number.

Q.7 Find the particular integral of $(D - \alpha)^2y = e^{\alpha x}f''(x)$.

Q.8 Find the P.I. of $(D^2 - 4)y = x^2$.

Q.9 Find the particular integral of $(D^3 - 3D^2 + 5)y = e^{2x}$.

Q.10 Find the particular integral of $(D^2 - 2D + 2)y = e^x \cos x$.

Q.11 Find the P.I. of $(D^2 + 4)y = \sin 2x$.

Q.12 Find the particular integral of $(D - 2)^2y = 8e^{2x}$.

Q.13 Solve: $(D + 1)^3y = 2e^{-x}$.

Q.14 Solve: $(D^3 + 2D^2 + D)y = e^x$.

Q.15 Solve: $(D + 1)^2y = 2e^{-x}$.

Q.16 Solve the following simultaneous differential equations: $\frac{dx}{dt} = 3y$, $\frac{dy}{dt} = 3x$.

Q.17 A function $n(x)$ satisfy the differential equation $\frac{d^2n(x)}{dx^2} - \frac{n(x)}{L^2} = 0$, L being constant boundary conditions are $n(0) = \alpha$ and $n(\infty) = 0$ find $n(x)$.

Q.18 Solve: $\frac{d^3y}{dx^3} = \log x$.

Q.19 Solve: $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = e^x \sin x$.

Q.20 Solve the differential equation: $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = \frac{e^{-x}}{2+x}$.

Q.21 Solve: $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = xe^x \sin x$.

Q.22 Solve: $(D^2 + 2D + 1)y = e^x \cos x$.

Q.23 Solve: $(D - 2)^2y = 8(e^{2x} + \sin 2x + x^2)$.

Q.24 Solve: $(D^2 - 2D + 4)y = e^x \cos x + \sin x \cos 3x$.

Q.25 Solve the differential equation: $(D^2 - 1)y = x \sin x + x^2 e^x$.

Q.26 Solve: $(D^2 + D - 2)y = e^x + \cos x$.

Q.27 Solve by method of variation of parameters: $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 9y = \frac{e^{3x}}{x^2}$.

Q.28 Solve by the method of variation of parameters: $\frac{d^2y}{dx^2} + a^2y = \sec ax$.

Q.29 Solve by method of variation of parameters: $\frac{d^2y}{dx^2} + 4y = \sec 2x$.

Q.30 Solve by method of variation of parameters: $\frac{d^2y}{dx^2} + y = \operatorname{cosec} x$.

Q.31 Solve by method of variation of parameters: $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 2y = e^{-x} \sec^3 x$.

Q.32 Solve the differential equation by the method of variation of parameters: $\frac{d^2y}{dx^2} + y = \tan x$.

Q.33 Solve the differential equation by the method of variation of parameters: $\frac{d^2y}{dx^2} + y = x \cos 2x$.

Q.34 Solve by method of variation of parameters: $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = \frac{e^x}{1+e^x}$.

Q.35 Use variation of parameter method to solve the differential equation: $x^2y'' + xy' - y = x^2e^x$.

Q.36 Use variation of parameter method to solve the differential equation: $(D^2 - 1)y = 2(1 - e^{-2x})^{-1/2}$.

Q.37 Solve: $x \frac{d^2y}{dx^2} + (4x^2 - 1) \frac{dy}{dx} + 4x^3y = 2x^3$ by changing the independent variable.

Q.38 Solve the differential equation by the changing the independent variable: $x \frac{d^2y}{dx^2} - \frac{dy}{dx} - 4y = 8x^3 \sin x^2$

Q.39 Solve: $(1+x)^2 \frac{d^2y}{dx^2} + (1+x) \frac{dy}{dx} + y = 4 \cos \log(1+x)$.

Q.40 Solve the differential equation: $x^2 \frac{d^2y}{dx^2} + 2x \frac{dy}{dx} - 12y = x^3 \log x$

Q.41 Solve: $(3x+2)^2 \frac{d^2y}{dx^2} + (3x+2) \frac{dy}{dx} - 12 = 6x$.

Q.42 Solve: $x^3 \frac{d^3y}{dx^3} + 3x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + y = x + \log x$.

Q.43 Solve: $x^2 \frac{d^3y}{dx^3} + x \frac{d^2y}{dx^2} + \frac{dy}{dx} = x^2 \log x$.

Q.44 Solve the following simultaneous differential equations: $\frac{dx}{dt} - y = t$, $\frac{dy}{dt} + x = 1$.

Q.45 Solve the following simultaneous differential equations: $\frac{dx}{dt} = y + 1$, $\frac{dy}{dt} = x + 1$.

Q.46 Solve: $\frac{d^2x}{dt^2} + y = \sin t$, $\frac{d^2y}{dt^2} + x = \cos t$.

Q.47 Solve the following simultaneous differential equations: $\frac{dx}{dt} + \frac{dy}{dt} + 3x = \sin t$, $\frac{dx}{dt} + y - x = \cos t$.

Q.48 Solve the following simultaneous differential equations: $\frac{dx}{dt} - 7x + y = 0$, $\frac{dy}{dt} - 2x - 5y = 0$.

Q.49 Solve the following simultaneous differential equations: $\frac{dx}{dt} = 3x + 2y$, $\frac{dy}{dt} = 5x + 3y$.

Q.50 Solve the following simultaneous differential equations: $\frac{dx}{dt} + x - 2y = 0$; $\frac{dy}{dt} + x + 4y = 0$; $x(0) = y(0) = 1$.

Q.51 Solve the following simultaneous differential equations: $\frac{dx}{dt} - y = e^t$; $\frac{dy}{dt} + x = \sin t$; $x(0) = 1, y(0) = 0$