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DEPARTMENT OF MATHEMATICS

Course: NUMBER THEORY, VECTOR CALCULUS AND COMPUTATIONAL METHODS	QUIZ - I	Maximum marks: 10
Course code: 22MA21C	First semester 2022-2023 Physics Cycle Branch: AI, BT, CD, CS, CY, IS, SPARK-P	Time: 20 Minutes Date: 05-07-2023

Name:	Branch:	USN:

Instructions to students: Rough work can be done at the backside of the sheet.

Q.No	Quiz questions	M	BT	CO
1.1	Using suitable interpolation, fit a polynomial for the data $\begin{array}{c\|c\|c\|c} x & -1 & 2 & 4 \\ \hline y & -5 & 4 & 0 \end{array}$ **Ans: $4x - x^2$**	2	L2	3
1.2	If $f(8) = 10,\ f(10) = 19,\ f(12) = 32.5,\ f(14) = 54,\ f(16) = 89.5$, then $\Delta^2 f(12) =$_____ **Ans: 14**	1	L1	1
1.3	The value of $\Delta^3[(1 + 3x)(1 - 5x)(1 - 4x)]$ taking the interval of differencing $h = 1$ is _____. **Ans: 360**	1	L1	1
1.4	The particular solution of the initial value problem $y'' + y' + 0.25y = 0$ with $y(0) = 3$ and $y'(0) = -3.5$ is _____. **Ans: $(3 - 2x)e^{-x/2}$**	2	L2	2
1.5	Particular integral of $2\frac{d^2y}{dx^2} + 3\frac{dy}{dx} - 2y = e^{x/2}$ is _____. **Ans: $\frac{xe^{x/2}}{5}$**	1	L2	2
1.6	If $x = e^{-3t}$ is the solution of the differential equation $\frac{d^2x}{dt^2} + 4\frac{dx}{dt} + kx = 0$, then $k =$ _____. **Ans: $k = 3$**	1	L1	1
1.7	Given $\begin{array}{c\|c\|c\|c\|c} x & 0 & 2 & 4 & 6 \\ \hline f(x) & 7 & 13 & 43 & 145 \end{array}$ The value of $f'(2) =$_____. **Ans: -3**	2	L2	1

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Q.No	Quiz questions	M	BT	CO
1.1	Using suitable interpolation, fit a polynomial for the data $\begin{array}{c\|c\|c\|c} x & -1 & 3 & 4 \\ \hline y & -4 & 0 & 6 \end{array}$ **Ans: $x^2 - x - 6$**	2	L2	3
1.2	If $f(1) = 0$, $f(1.2) = 0.128$, $f(1.4) = 0.544$, $f(1.6) = 1.296$, $f(1.8) = 2.432$, then $\nabla^2 f(1.6) =$_____ **Ans: 0.336**	1	L1	1
1.3	The value of $\Delta^6[(2 - 3x)(3 - 4x^2)(2 + 5x^3)]$ taking the interval of differencing $h = 1$ is _____. **Ans: 43200**	1	L1	1
1.4	The particular solution of the initial value problem $9y'' + 6y' + y = 0$ with $y(0) = 4$ and $y'(0) = -\frac{13}{3}$ is _____. **Ans: $(4 - 3x)e^{-x/3}$**	2	L2	2
1.5	Particular integral of $4\frac{d^2y}{dx^2} + 3\frac{dy}{dx} - 10y = e^{-2x}$ is _____. **Ans: $-\frac{xe^{-2x}}{13}$**	1	L2	2
1.6	If the roots of the auxiliary equation are -2 and 3, then the corresponding differential equation is _____. **Ans: $\frac{d^2y}{dx^2} - \frac{dy}{dx} - 6y = 0$**	1	L1	1
1.7	Given $\begin{array}{c\|c\|c\|c\|c} x & 1 & 3 & 5 & 7 \\ \hline f(x) & 2 & 7 & 16 & 29 \end{array}$ The value of $f'(7) =$_____. **Ans: 7.5**	2	L2	1

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Instructions to students: Rough work can be done at the backside of the sheet.

Q.No	Quiz questions	M	BT	CO
1.1	Using suitable interpolation, fit a polynomial for the data $\begin{array}{c\|c\|c\|c} x & 2 & 4 & 5 \\ \hline y & 0 & 6 & 12 \end{array}$ **Ans: $x^2 - 3x + 2$**	2	L2	3
1.2	If $f(0.2) = 0.0350$, $f(0.4) = 0.1170$, $f(0.6) = 0.2165$, $f(0.8) = 0.2995$, $f(1) = 0.3340$, then $\Delta^2 f(0.8) =$ _____ **Ans: Does not exist**	1	L1	1
1.3	The value of $\Delta^3[(1-x)(1-3x)(1-5x)]$ taking the interval of differencing $h = 2$ is _____. **Ans: -720**	1	L1	1
1.4	The particular solution of the boundary value problem $y'' + y = 0$ with $y(0) = 1$ and $y\left(\frac{\pi}{2}\right) = 2$ is _____. **Ans: $\cos x + 2\sin x$**	2	L2	2
1.5	Particular integral of $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 5y = 3^x + e^x$ is _____. **Ans: $\frac{e^x}{10} + \frac{3^x}{(\log_e 3)^2 + 4\log_e 3 + 5}$**	1	L2	2
1.6	If the complementary function of the differential equation is $y = (c_1 + c_2 x)e^{-2x}$, then the corresponding differential equation is _____. **Ans: $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 4y = 0$**	1	L1	1
1.7	Given $\begin{array}{c\|c\|c\|c\|c} x & 20 & 25 & 30 & 35 \\ \hline f(x) & 354 & 332 & 291 & 260 \end{array}$ The value of $f'(30) =$ _____. **Ans: -10.1**	2	L2	1

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Name:	Branch:	USN:

Instructions to students: *Rough work can be done at the backside of the sheet.*

Q.No	Quiz questions	M	BT	CO
1.1	Using suitable interpolation, fit a polynomial for the data <table><tr><td>x</td><td>3</td><td>4</td><td>8</td></tr><tr><td>y</td><td>5</td><td>8</td><td>0</td></tr></table> **Ans:** $-x^2 + 10x - 16$	2	L2	3
1.2	If $f(1) = 7.4036$, $f(2) = 7.7815$, $f(3) = 8.1311$, $f(4) = 8.4554$, $f(5) = 8.7574$, then $\nabla^2 f(4) = $_____ **Ans:** -0.0253	1	L1	1
1.3	The value of $\Delta^4[(1 - 2x)(1 - 3x)(1 - 5x)(1 - 6x)]$ taking the interval of differencing $h = 2$ is _____. **Ans: 69120**	1	L1	1
1.4	The particular solution of the initial value problem $9y'' - 25y = 0$ with $y(0) = 0$ and $y'(0) = -5$ is _____. **Ans:** $-1.5e^{\frac{5x}{3}} + 1.5e^{-\frac{5x}{3}}$	2	L2	2
1.5	Particular integral of $3\frac{d^2y}{dx^2} - 2\frac{dy}{dx} - 5y = e^{5x/3}$ is _____. **Ans:** $\dfrac{xe^{\frac{5x}{3}}}{8}$	1	L2	2
1.6	If $x = e^{-t}$ is the solution of the differential equation $\frac{d^2x}{dt^2} - 6\frac{dx}{dt} - nx = 0$, then $n = $ _____. **Ans:** $n = 7$	1	L1	1
1.7	Given <table><tr><td>x</td><td>1</td><td>4</td><td>7</td><td>10</td></tr><tr><td>$f(x)$</td><td>416</td><td>240</td><td>212</td><td>135</td></tr></table> The value of $f'(1) = $_____. **Ans:** -105.2222	2	L2	1

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