DEPARTMENT OF MATHEMATICS

Course: NUMBER THEORY, VECTOR CALCULUS AND COMPUTATIONAL METHODS	QUIZ - II	Maximum marks: 10
Course code: 22MA21C	Second semester 2022-2023 Physics Cycle Branch: AI, BT, CD, CS, CY, IS, SPARK-C	Time: 20 Minutes Date: 16-08-2023

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	The Wronskian of the function $u = e^{2x}$ and $v = xe^{2x}$ is _____. **Ans:** e^{4x}	2	L2	2
1.2	Reduce the Cauchy-Euler differential equation $x^2 \frac{d^2y}{dx^2} - 7x \frac{dy}{dx} + 16y = \log_e(x)$ to linear differential equation with constant coefficients. **Ans:** $\left(D_1^2 - 8D_1 + 16\right)y = z, \quad D_1 = \frac{d}{dz}$	1	L1	1
1.3	The number of integers less than 176 that are relatively prime to 176 is _____. **Ans: 80**	1	L2	2
1.4	Non-negative remainder obtained when $1! + 2! + 3! + \cdots + 100!$ is divided by 12 is _____. **Ans: 9**	1	L1	1
1.5	The number of positive divisors of the integer 1363 is_____. **Ans: 4**	1	L1	1
1.6	If $720 = 2^a 3^b 5^c$, where a, b, c are positive integers, then the product of a, b, c is_____. **Ans: 8**	1	L1	1
1.7	The multiplicative inverse of 7 $(mod\ 23)$ is _____. **Ans: 10**	1	L2	2
1.8	Remainder obtained when 21^{875} is divided by 17 is _____. **Ans: 13**	2	L2	2

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1.1	The Wronskian of the function $u = \sin\left(\frac{x}{2}\right)$ and $v = \cos\left(\frac{x}{2}\right)$ is _____. **Ans: $-\frac{1}{2}$**	2	L2	2
1.2	Reduce the Cauchy-Euler differential equation $x^2\frac{d^2y}{dx^2} - x\frac{dy}{dx} + 2y = x\sin(\log_e(x))$ to linear differential equation with constant coefficients. **Ans: $\left(D_1^2 - 2D_1 + 2\right)y = e^z \sin(z), \quad D_1 = \frac{d}{dz}$**	1	L1	1
1.3	The number of integers less than 223 that are relatively prime to 223 is _____. **Ans: 222**	1	L2	2
1.4	Non-negative remainder obtained when $1! + 2! + 3! + \cdots + 100!$ is divided by 14 is _____. **Ans: 5**	1	L1	1
1.5	The number of positive divisors of the integer 1412 is_____. **Ans: 6**	1	L1	1
1.6	If $1008 = 2^p 3^q 7^r$, where p, q, r are positive integers, then the sum of p, q, r is_____. **Ans: 7**	1	L1	1
1.7	The multiplicative inverse of 12 $(mod\ 19)$ is _____. **Ans: 8**	1	L2	2
1.8	Remainder obtained when 51^{733} is divided by 29 is _____. **Ans: 13**	2	L2	2

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Q.No	Quiz questions	M	BT	CO
1.1	The Wronskian of the function $u = e^{-3x}$ and $v = e^{x/5}$ is _____. **Ans:** $\frac{16}{5} e^{-\frac{14}{5}x}$	2	L2	2
1.2	Reduce the Cauchy-Euler differential equation $x^2 \frac{d^2y}{dx^2} + 2x \frac{dy}{dx} - 12y = x^2 \log_e(x)$ to linear differential equation with constant coefficients. **Ans:** $\left(D_1^2 + D_1 - 12\right)y = e^{2z} z, \quad D_1 = \frac{d}{dz}$	1	L1	1
1.3	The number of integers less than 247 that are relatively prime to 247 is _____. **Ans: 216**	1	L2	2
1.4	Non-negative remainder obtained when $1! + 2! + 3! + \cdots + 100!$ is divided by 7 is _____. **Ans: 5**	1	L1	1
1.5	The number of positive divisors of the integer 1881 is_____. **Ans: 12**	1	L1	1
1.6	If $693 = 3^k 7^l 11^m$, where k, l, m are positive integers, then the sum of k, l, m is_____. **Ans: 4**	1	L1	1
1.7	The multiplicative inverse of $11 \ (mod \ 27)$ is _____. **Ans: 5**	1	L2	2
1.8	Remainder obtained when 71^{717} is divided by 23 is _____. **Ans: 4**	2	L2	2

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Q.No	Quiz questions	M	BT	CO
1.1	The Wronskian of the function $u = xe^{4x}$ and $v = e^{4x}$ is _____. **Ans: $-e^{8x}$**	2	L2	2
1.2	Reduce the Cauchy-Euler differential equation $x^2\frac{d^2y}{dx^2} + 3x\frac{dy}{dx} + 5y = x^3\cos(\log_e(x))$ to linear differential equation with constant coefficients. **Ans: $(D_1^2 + 2D_1 + 5)y = e^{3z}cos(z), \quad D_1 = \frac{d}{dz}$**	1	L1	1
1.3	The number of integers less than 301 that are relatively prime to 301 is _____. **Ans: 252**	1	L2	2
1.4	Non-negative remainder obtained when $1! + 2! + 3! + \cdots + 100!$ is divided by 8 is _____. **Ans: 1**	1	L1	1
1.5	The number of positive divisors of the integer 1045 is_____. **Ans: 8**	1	L1	1
1.6	If $882 = 2^x 3^y 7^z$, where x, y, z are positive integers, then the product of x, y, z is_____. **Ans: 4**	1	L1	1
1.7	The multiplicative inverse of 13 $(mod\ 29)$ is _____. **Ans: 9**	1	L2	2
1.8	Remainder obtained when 47^{757} is divided by 19 is _____. **Ans: 9**	2	L2	2