BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION MO 2022)

CLASS: BARCH **SEMESTER: I**
BRANCH: BARCH **SESSION: MO/2024**

SUBJECT: MA104 MATHEMATICS FOR ARCHITECTS

TIME: 03 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Reduce the matrix A to row reduced echelon form and then find the rank. $A=\begin{bmatrix}1&1&1&1\\1&1&1&1\\0&1&2&3\\0&1&2&3\end{bmatrix}$	[5]	1,3	L1
Q.1(b)	Show that the given matrix A satisfies its characteristic equation A=$\begin{bmatrix}1&-1&1\\-1&1&2\\1&2&1\end{bmatrix}$	[5]	1,3	L1
Q.2(a)	Find the n^{th} derivative of $x^3 sinx$.	[5]	1,3	L1
Q.2(b)	Find the maximum and minimum values of $f(x)=x^3-3x^2-9x$ in the internal (0,4).	[5]	2,3,4	L2
Q.3(a)	Find $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ for the following functions: (i) $f(x,y)=(x^2-1)(y+2)$ (ii) $f(x,y)=e^{x+y+1}$	[5]	1,3	L1
Q.3(b)	If $u=\sin^{-1}\left(\frac{x^2+y^2}{x+y}\right)$, show that $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial x}=\tan u$	[5]	1,3	L1
Q.4(a)	If $u=e^x siny, v=xlogsiny;\ evaluate\ \frac{\partial(u,v)}{\partial(x,y)}$.	[5]	1,3	L1
Q.4(b)	Expand $e^x \log(1+y)$ in power of x and y up to 3rd degree term.	[5]	2,3,4	L2
Q.5(a)	Find the mean and standard deviation of the following frequency distribution:	[5]	1,3,	L1

X	10	20	30	40	50	60
y	9	18	25	27	14	7

Q.5(b)	Find the least-squares regression line to the following data:				[5]	1,2,3	L2

X	2	7	9	1	5	12
Y	13	21	23	14	15	21

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