INDIAN SCHOOL AL WADI AL KABIR

Unit test (2023-2024)

Class: XII Sub: MATHEMATICS (041) MS Max Marks: 30

Date: 01.06.2023 Time: 1 hr.

General Instructions:

1. This question paper is divided in to 4 sections- A, B, C and D.
2. Section A comprises of 7 questions of 1 mark each.
3. Section B comprises of 3 questions of 2 marks each.
4. Section C comprises of 3 questions of 3 marks each.
5. Section D comprises of 2 case study-based question.
6. Internal choice has been provided.

SECTION A

Q.1.	D (5)	1
Q2.	C (6, 8)	1
Q3.	A (π)	1
Q4.	$D. -\frac{24}{25}$	1
Q5.	B (Zero matrix)	1
Q6.	A (Reflexive but not symmetric)	1
Q7	B (A and R are correct but not the correct explanation) Assertion (A): If A and B are symmetric matrices then AB – BA is a skew symmetric matrix. Reason (R): For a skew symmetric matrix A= $[a_{ij}], a_{ij} = 0\ if\ i = j$.	1
	SECTION B	
Q8.	$AB = \begin{pmatrix} 11 & 14 \\ 7 & 18 \\ 18 & 22 \end{pmatrix}$.	2
Q9.	LHL= RHL = f(x) at x=$\frac{\pi}{4}$. Multiplying $and\ dividing\ \sqrt{2}$ Applying limits and getting $k = \frac{\sqrt{2}}{4} = \frac{1}{2\sqrt{2}}$	1 1

	OR $$ylogx = xlogy$$ $$\frac{y}{x} + logx\frac{dy}{dx} = \frac{x}{y}\frac{dy}{dx} + logy$$ $$\frac{dy}{dx} = \frac{y(xlogy - y)}{x(ylogx - x)}$$	
Q10.	Proving reflexive, symmetric and transitive. Hence equivalence	2
	SECTION C	
Q11.	$A^2 - 3A - 7I = \begin{pmatrix} 22 & 9 \\ -3 & 1 \end{pmatrix} - \begin{pmatrix} 15 & 9 \\ -3 & -6 \end{pmatrix} - \begin{pmatrix} 7 & 0 \\ 0 & 7 \end{pmatrix} = 0$	1+1+1
Q12.	$If\ x\sqrt{1+y} + y\sqrt{1=x} = 0, then\ prove\ that\ \frac{dy}{dx} = -\frac{1}{(1+x)^2}$	
	$x\sqrt{1+y} = -y\sqrt{1+x}$ *Squaring both sides* $(x\sqrt{1+y})^2 = (-y\sqrt{1+x})^2$ $x^2(\sqrt{1+y})^2 = (-y)^2(\sqrt{1+x})^2$ $x^2(1+y) = y^2(1+x)$ $x^2 + x^2y = y^2 + y^2x$	$-(y - x)(x + y) = xy(y - x)$ $-(x + y) = xy$ $-x - y = xy$ $-x = xy + y$ $-x = (x + 1)y$ $\boldsymbol{y = \frac{-x}{x+1}}$	2
	$\frac{dy}{dx} = \frac{\frac{d(-x)}{dx}(x+1) - \frac{d(x+1)}{dx}.(-x)}{(x+1)^2}$ $\frac{dy}{dx} = \frac{-1(x+1) + (1+0)x}{(x+1)^2}$ $\frac{dy}{dx} = \frac{-x - 1 + x}{(x+1)^2}$ $\boldsymbol{\frac{dy}{dx} = \frac{-1}{(x+1)^2}}$	OR $(x^2 + y^2)^2 = xy$ $2((x^2 + y^2)(2x + 2yy') = xy' + y$ Simplifying $\frac{dy}{dx} = \frac{y - 4x(x^2+y^2)}{4y(x^2+y^2) - x}$.	2 1

Q13.	Proving one to one Proving onto	1.5 1.5

	SECTION D Case study-based study questions	
14	$a)$ 46000 b) 53000 c) 31000 c) A- 15000 B 17000 $\begin{pmatrix} 10000 & 2000 & 18000 \\ 6000 & 20000 & 8000 \end{pmatrix}\begin{pmatrix} 2.5 & 2 \\ 1.5 & 1 \\ 1 & 0.5 \end{pmatrix} = \begin{pmatrix} 46000 & 31000 \\ 53000 & 36000 \end{pmatrix}$ **OR**	1 1 2
15.	a) $[1, \infty)$ b) Preimage=$\sqrt{8} = 2\sqrt{2}$ c) Proving continuous but LHD$\neq RHD\ at\ x = 0$ c) Not onto. Modified codomain = $[2, \infty)$	1 1 2

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