SETHU BHASKARA MAT HR SEC SCHOOL
QUARTERLY EXAM - 2022
STD: XI BUSINESS MATHS - ANSWER KEY

PART-I (20×1=20)				PART-II (7×2=14)	
1)	c) $k^3\|A\|$	1	21.	$\|A\| = 0$	1
2)	d) 2	1		A^{-1} is not exist.	1
3)	a) $1/4$	1	22.	$adj A = \begin{pmatrix} 4 & -3 \\ -1 & 2 \end{pmatrix}$	2
4)	a) 0	1			
5)	c) 6	1	23.	a) 7	1
6)	b) $2^n - 1$	1		b) 336	1
7)	a) 120	1	24.	$\frac{(n-1)!}{2}$	1
8)	c) 2^n	1		$= \frac{9!}{2}$	1
9)	c) $1/3$	1	25.	$d_1 = \frac{5}{\sqrt{2}}, d_2 = \frac{5}{\sqrt{2}}$	1
10)	a) 3	1		$\therefore d_1 = d_2$	1
11)	a) 25	1	26.	$(x-3)^2 + (y-5)^2 = 5^2$	1
12)	b) $4x-1=0$	1		$x^2 + y^2 - 6x - 10y + 9 = 0$	1
13)	b) $-\frac{\sqrt{3}}{2}$	1			
14)	c) 0	1	27.	$\sin 300 = \sin(360-60)$	
15)	c) $\pi/3$	1		$\sin 300 = -\frac{\sqrt{3}}{2}$	1
16)	b) $\sin 50$	1		$\cos(-210) = \cos 210$	
17)	d) x^2+x+1	1		$= \cos(180+30)$	
18)	c) (0,1)	1		$\therefore \cos(-210) = -\frac{\sqrt{3}}{2}$	1
19)	c) 1	1	28	$\cos 4A + \cos 2A$	
20)	d) $a^x \log a$.	1		$= 2\cos\left(\frac{4A+2A}{2}\right)\cos\left(\frac{4A-2A}{2}\right)$	1
				$= 2\cos 3A \cos A$.	1

29. $f(x) = \begin{cases} \frac{|x|}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$ — 1, 1

30. $y = \sin(x^2)$ — 1

$\frac{dy}{dx} = 2x\cos(x^2)$ — 1

31. $AB = \begin{pmatrix} 67 & 87 \\ 47 & 61 \end{pmatrix}$ — 1

$(AB)^{-1} = \frac{1}{-2}\begin{pmatrix} 61 & -87 \\ -47 & 67 \end{pmatrix}$ — 1

$B^{-1}A^{-1} = \frac{1}{-2}\begin{pmatrix} 61 & -87 \\ -47 & 67 \end{pmatrix}$ — ½

$\therefore (AB)^{-1} = B^{-1}A^{-1}.$ — ½

32. $B = \begin{pmatrix} 0.6 & 0.9 \\ 0.2 & 0.8 \end{pmatrix}$ — ½

$I - B = \begin{pmatrix} 0.4 & -0.9 \\ -0.2 & 0.2 \end{pmatrix}$ — 1

$|I - B| = -0.10$ — 1

$\therefore$ System not Viable. — ½

33. $\frac{4x+1}{(x-2)(x+1)} = \frac{A}{x-2} + \frac{B}{x+1}$ — 1

$A = 3, B = 1$ — 1

$\frac{4x+1}{(x-2)(x+1)} = \frac{3}{x-2} + \frac{1}{x+1}$ — 1

34. A, C, H, T — ½

A - - - = 3! = 6

CA - - = 2! = 2

CHAT = 1 = 1

$\underline{\quad 9 \quad}$ — 1½

$\therefore$ Rank is 9. — ½

35. $\begin{vmatrix} 3 & -5 & -11 \\ 5 & 3 & -7 \\ 1 & k & 0 \end{vmatrix} = 0$ — 1

$3\begin{vmatrix} 3 & -7 \\ k & 0 \end{vmatrix} + 5\begin{vmatrix} 5 & -7 \\ 1 & 0 \end{vmatrix} - 11\begin{vmatrix} 5 & 3 \\ 1 & k \end{vmatrix} = 0$ — 1

$\therefore k = 2.$ — 1

36. $xx_1 + yy_1 - 2(x + x_1) + 2(y + y_1) - 8 = 0$ — 1

$-2x - 2y - 2x + 4 + 2y - 4 - 8 = 0$ — 1

$\therefore x + 2 = 0$ — 1

37. $\sin A \cdot \sin(60 + A)\sin(60 - A)$

$= \sin A\,(\sin^2 60 - \sin^2 A)$ — 1

$= \frac{1}{4}(3\sin A - 4\sin^3 A)$ — 1

$= \frac{1}{4}\sin 3A.$ — 1

38. $\tan^{-1}\left(\frac{4}{3}\right) - \tan^{-1}\left(\frac{1}{7}\right)$

$= \tan^{-1}\left(\frac{4/3 - 1/7}{1 + \frac{4}{21}}\right)$ — 1

$= \tan^{-1}(1)$ — 1

$= \frac{\pi}{4}$ — 1

39. $\lim_{x\to 0} \frac{\sin^2 3x}{x^2}$

$= \lim_{x\to 0} \frac{\sin^2 3x}{x^2} \times \frac{9}{9}$ 1

$= 9 \lim_{x\to 0} \left(\frac{\sin 3x}{3x}\right)^2$ 1

$= 9(1)$

$= 9.$ 1

40. $u = \sin^2 x \quad V = x^2$ 1

$\frac{du}{dx} = \sin 2x \quad \frac{dv}{dx} = 2x$ 1

$\therefore \frac{du}{dV} = \frac{\sin 2x}{2x}.$ 1

PART-IV

41. a)

$AB = \frac{1}{5}\begin{pmatrix} 5 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 5 \end{pmatrix}$ 1

$AB = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} = I_3$ 1

$BA = \frac{1}{5}\begin{pmatrix} 5 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 5 \end{pmatrix}$ 1

$BA = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} = I_3$ 1

$\therefore AB = BA = I_3$ 1

A & B are inverse of each other.

41. b)

Step-1 Let P(n)-denoted by the given statement (i.e) $5^{2k+1}-1$-is divisible by 24. 1

Step-2

$P(1) = 5^{2(1)} - 1$

$= 25 - 1$

$= 24$

$\therefore$ P(1)-is true 1

Step-3 Assume that P(k)-is true. 1

Step-4 T.P.T: P(k+1)-is true.

$P(k+1) = 5^{2(k+1)} - 1$

$= 5^{2k} \times 5^2 - 1$

$= 25(5^{2k}) - 1$

$= 25(24m+1) - 1$

$= 25(24m) + 24$

$= 24(25m+1)$

$\therefore$ P(k+1)-is true. 1

Step-5

P(n)-is true. 1

42 (a)

$x = x,\ a = \frac{-2}{x^2},\ n = 15$ 1

$t_{r+1} = 15C_r(-2)^r x^{15-3r}$ 2

$r = 5$ 1

$\therefore t_6 = -32\,15C_5$ 1

42 (b)		1
	$x^2+y^2+2gx+2fy+c=0$	
	$2f+c=-1$	½
	$8g+6f+c=-25$	½
	$2g-2f+c=-2$	½
	$f=-1,\ c=1$	1
	$g=\frac{-5}{2}$	½
	$x^2+y^2-5x-2y+1=0$	1
43. (a)		
	$a=4,\ b=9,\ h=6$	1
	$h^2-ab=36-36=0$	1
	$4x^2+12xy+9y^2 = (2x+3y)^2$	1
	$2x+3y-1=0$	1
	$2x+3y-2=0$	1
43 (b)	$x+y+z=20$	½
	$2x+y-z=23$	½
	$3x+y+z=46$	½
	$Ax=B$	
	$x=A^{-1}B$	½
	$A^{-1}=\frac{1}{-4}\begin{pmatrix}2&0&-2\\-5&-2&3\\-1&2&-1\end{pmatrix}$	1
	$x=\frac{1}{-4}\begin{pmatrix}2&0&-2\\-5&-2&3\\-1&2&-1\end{pmatrix}\begin{pmatrix}20\\23\\46\end{pmatrix}$	1
	$\therefore x=13, y=2, z=5$	1

44 (b)	$\sin(180+A)=-\sin A$	
	$\cos(90-A)=\sin A$	1
	$\tan(270-A)=\cot A$	
	$\sec(540-A)=-\sec A$	1
	$\cos(360+A)=\cos A$	
	$\operatorname{cosec}(270+A)=-\sec A$	1
	$LHS=\frac{(-\sin A)\sin A\cot A}{(-\sec A)\cos A(-\sec A)}$	1
	$=-\sin A\cos^2 A$	1
	$\therefore LHS=RHS.$	
44 (a)	$B=\begin{pmatrix}3/7&2/13\\4/7&6/13\end{pmatrix}$	1
	$I-B=\begin{pmatrix}4/7&-2/13\\-4/7&7/13\end{pmatrix}$	1
	$\lvert I-B\rvert=\frac{20}{91}$	1
	$X=(I-B)^{-1}D$	
	$(I-B)^{-1}=\frac{1}{20}\begin{pmatrix}49&14\\52&52\end{pmatrix}$	
	$X=\frac{1}{20}\begin{pmatrix}49&14\\52&52\end{pmatrix}\begin{pmatrix}12\\18\end{pmatrix}$	1
	$\therefore x_1=42,\ x_2=78.$	1
	* Decimal can use.	
45 (a)	$LHS=\cos 20\cos 40\cos 60\cos 80$	
	$=\frac{1}{2}(\cos 20\cos 40\cos 80)$	1
	$=\frac{1}{2}\left[\frac{1}{2}(\cos 60+\cos 20)\right]\cos 80$	1

$= \frac{1}{8}\left(\cos 80 - \cos 80 + \frac{1}{2}\right)$ 1

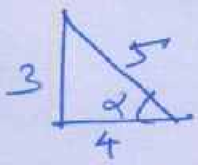
$= \frac{1}{8}\left(\frac{1}{2}\right)$ 1

$= \frac{1}{16}.$ 1

$\therefore$ LHS = RHS.

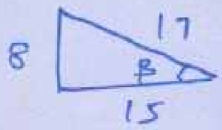
45 (b)

$\alpha = \sin^{-1}\left(\frac{-3}{5}\right)$



$\alpha = \tan^{-1}\left(\frac{3}{4}\right)$ 1

$\beta = \sin^{-1}\left(\frac{-8}{17}\right)$



$\beta = \tan^{-1}(8/15)$ 1

$\alpha - \beta = \tan^{-1}(3/4) - \tan^{-1}(8/15)$ ½

$= \tan^{-1}\left(\frac{3/4 - 8/15}{1 + \frac{24}{60}}\right)$ ½

$= \tan^{-1}\left(\frac{13}{84}\right)$ 1

$= \cos^{-1}\left(\frac{84}{85}\right).$ 1

$\therefore \sin^{-1}\left(\frac{-3}{5}\right) - \sin^{-1}\left(\frac{-8}{17}\right) = \cos^{-1}\left(\frac{84}{85}\right).$

46)(a)

$f(2) = 2+2 = 4$ 1

$L[f(2)] = \lim_{x \to 2^-} (2-x) = 2-2 = 0$ 1

$R[f(2)] = \lim_{x \to 2^+} 2+x = 4$ 1

$\therefore L[f(2)] \neq R[f(2)]$ 1

$\therefore f$ is not continuous at $x = 2$. 1

46)(b) $f(x) = \log(x+1)$ 1

$f'(x) = \underset{h \to 0}{Lt} \frac{f(x+h) - f(x)}{h}$ 1

$= \underset{h \to 0}{Lt} \frac{\log(x+1+h) - \log(x+1)}{h}$ 1

$= \underset{h \to 0}{Lt} \frac{\log\left(1 + \frac{h}{x+1}\right)}{\frac{h}{x+1} \times (x+1)}$ 1

$= \frac{1}{x+1}.$ 1

$\therefore f'(x) = \frac{1}{x+1}.$ 1

47)(a) $y = \left(x + \sqrt{1+x^2}\right)^m$ 1

$y_1 = m\left(x + \sqrt{1+x^2}\right)^{m-1}\left(1 + \frac{2x}{2\sqrt{1+x^2}}\right)$ 1

$y_1 = \frac{m\left(x+\sqrt{1+x^2}\right)^{m-1}\left(x + \sqrt{1+x^2}\right)}{\sqrt{1+x^2}}$ 1

$y_1 = m\left(x + \sqrt{1+x^2}\right)^m / \sqrt{1+x^2}$ 1

$y_1\sqrt{1+x^2} = my$

$y_1^2(1+x^2) = m^2y$ — 1

$(1+x^2)y_2 + 2xy_1 - m^2y_1 = 0$ — 1

47 (b) $y^2 = -12x$

$4a = 12$

$a = 3$ — 1

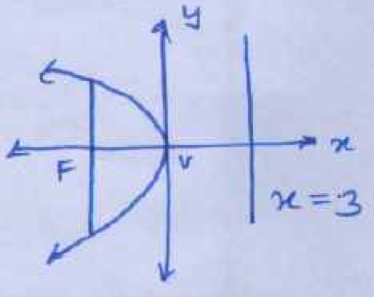
Focus $(-3, 0)$ — 1

Vertex $(0, 0)$ — 1

Directrix $x = +3$

Axis x-axis — 1

Length of the LR $= 12$.



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