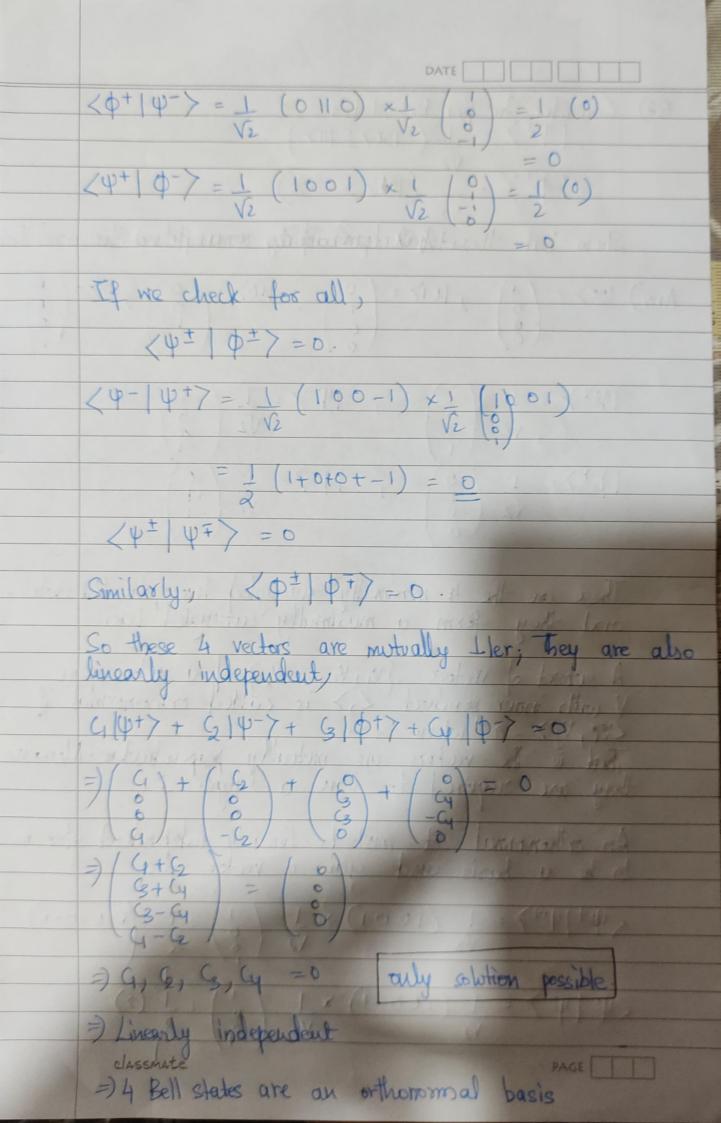
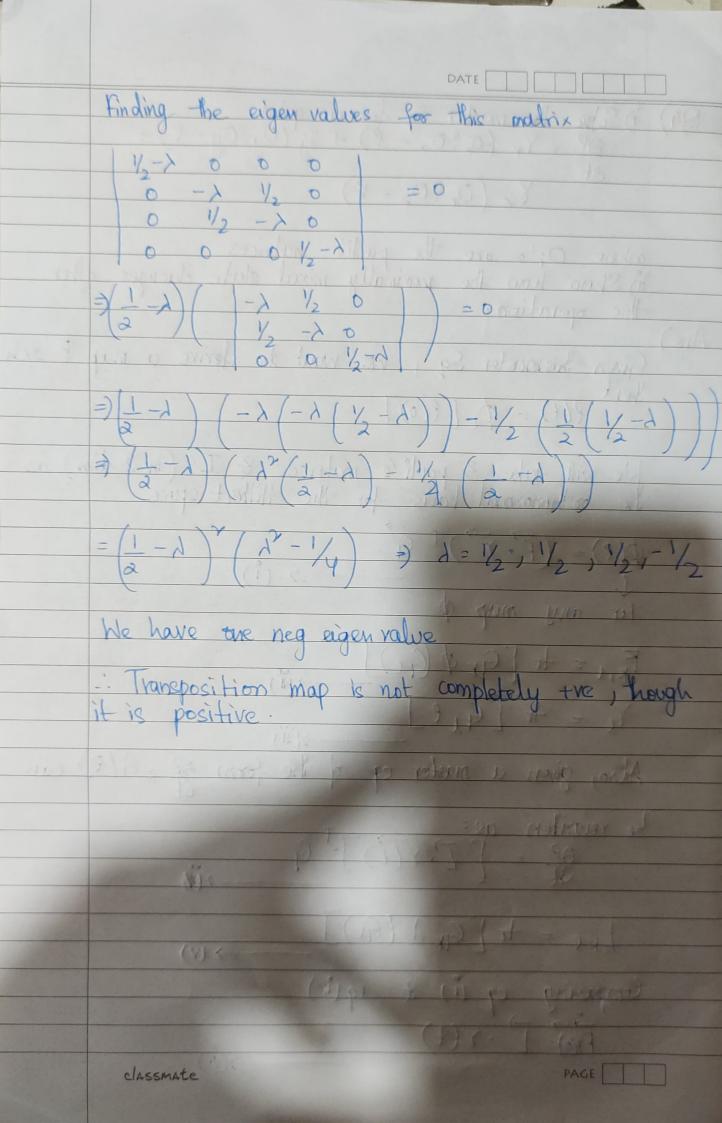


	DATE
0,2)	Consider the four Bel states $ \Psi^{\pm}\rangle = \frac{1}{\sqrt{2}} (1007 \pm 1117)$
	Show that these is vectore form a complete ornaumral by
Ans)	$ 00\rangle = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}, 01\rangle = \begin{pmatrix} 0 \\ 1 \\ 0 \\ 0 \end{pmatrix}, 10\rangle = \begin{pmatrix} 0 \\ 0 \\ 1 \\ 0 \end{pmatrix}$
	$ \psi^{\dagger}\rangle = \psi \psi \psi \psi \psi \psi \psi \psi \psi $
	$ \phi^{+} \rangle = 1 \qquad \phi^{-} \rangle = $
	These are the 4 maximally entangled two-qubit Bel states.
,10	and they form a maximally entangled basis
. /10	A subset of vectors $SV_1, V_2,, V_k & of a vector space V with inner product \langle , \rangle is called orthonormal if \langle V_1^a, V_1^a \rangle = 0 when i \neq j.$
	A subset of vectors SV_1, V_2, V_2 of a vector space V with inner product \langle , \rangle is called orthonormal if $\langle V_1^2, V_2^2 \rangle = 0$ when $i \neq j$. That is the vators are notually perpendicular. Moreover they are required to have a length = 1.
	A subset of vectors $\{V_1, V_2, \dots, V_k\}$ of a vector space V with inner product $\{\zeta_i\}$ is called orthonormal if $\{V_i^c, V_i^c\} = 0$ when $i \neq j$. That is the vectors are mutually perpendicular. Moreover they are required to have a length = 1. An orthonormal set must be linearly independent for it to be a basis and span a vector space.
	and they form a maximally entergled basis A subset of vectors $SV_1, V_2,, V_r > 0$ a vector space V with inner product $S_r > 0$ is called orthonormal if $SV_1, V_1 > 0$ when $S_r > 0$ when $S_r > 0$ is called orthonormal if That is the vators are mutually perpendicular Moneover they are required to have a length = 1. An orthonormal set must be linearly independent for it to be a basis and span a vector space. $SV_1, V_2,, V_r > 0$ a vector space.
	A subset of vectors SV_1, V_2, V_k of a vector space V with inner product \langle , \rangle is called orthonormal if $\langle V_1^e, V_2^e \rangle = \delta$ when $i \neq j$. That is the vectors are mutually perpendicular. Moreover they are required to have a length = 1. An orthonormal set must be linearly independent for it to be a basis and span a vector space. $\langle \psi^+ \psi^+ \rangle = I$ (1001) \star I

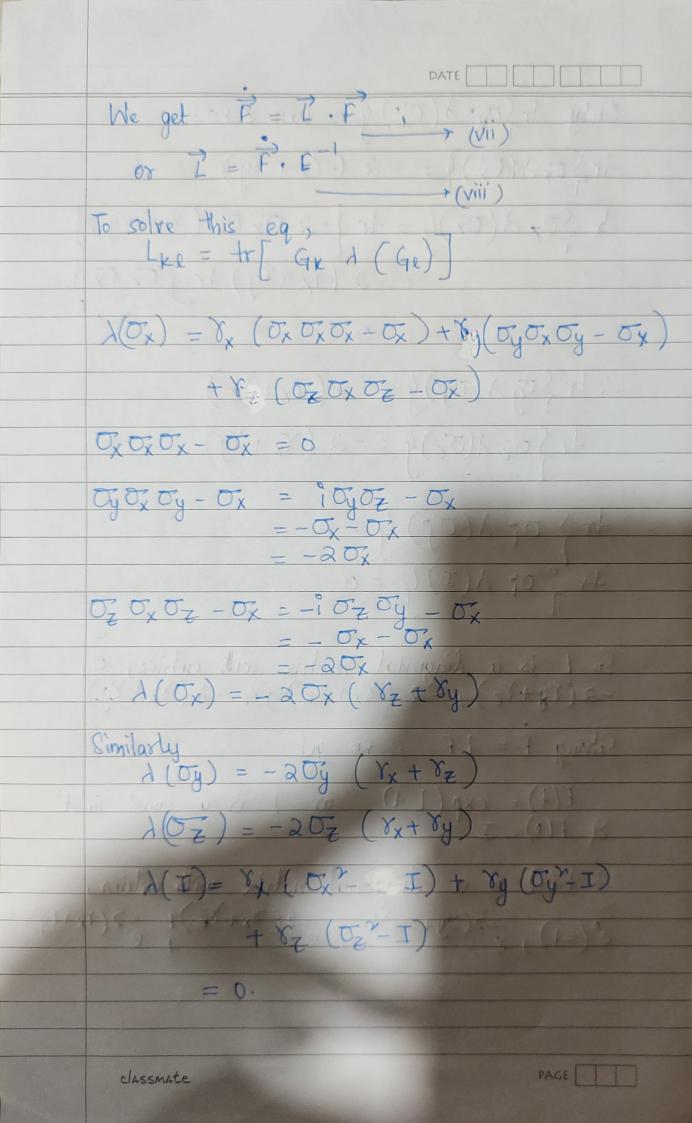


	DATE
Q3)	Consider the Linbald master Equation SP = 1 [P, H] + 5 x o [A; PA; + -1 A; A; P-
	SP = i [P, H] + > Y; A; PA; -1 A; A; Y-
*14. 1	2 RA; A; to Conf
	Show that the total probability remains unchanged under
	Show that the total probability remains unchanged under the action of this master equation.
Ans)	
HIB	P is the density matrix, state of the system. Tr[P] gives the total probability:
110	
	of in the master Linbald form gives a infinitesimal
	dunamic map:
	dynamic map.
	So for the total probability to remain unchanged,
	at [Tre] = 0.
	Here,
	at to
	: whighing stoleran widowl)
	at [Tre] = i Tr [[B, H]] + 28° Tr [A;PA;+-1 A;A;P-1PA;A;
A	Using the cyclic property of trace,
	Tr [AiPAit] = Tr [AitAiP] = Tr [PAi Ait]
	- (50.117)
A	also, Tr([P,H])=0
	= 8 [Tr[e]] = 1 x0 + 2 8; [o]
	at the second se
	= 6
	So the total probability, given by to (?) remains constant under the action of this master Equation.
	classmate

	DATE
(95)	Show that, for the qubit, the transposition map is not completely positive.
,,,,	Let us take a maximally entangled state in 2x2
	147 = 1 (100) + 111
	$ \Psi\rangle\langle\Psi =1$ (6) $\times 1$ (1001) $= 1$ (1001) $= 1$ (1001) $= 1$ (1001) $= 1$ (1001)
100	Let us take the transposition map T.
	$P = \begin{pmatrix} P_{11} & P_{12} \\ P_{21} & P_{22} \end{pmatrix}$, $T(P) = \begin{pmatrix} P_{11} & P_{21} \\ P_{12} & P_{22} \end{pmatrix}$
	Positivity:
	(1) 22 = 1+12
Mill	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	Checking complete positivity:
41	INT(14><41) = /T(1/20) + T(10 1/2)
	T(00) T(00)
	1 1 1 1 1 (N DA) : FIA (16 16)
	= (1/2 : (611,97) 9 17 0/1)
	0 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
	0 0 0 1/2
	warmy (3) at not note with letter Into the 3
10/1	ups reterm sid for control it refers simbores
	classmate



	DATE
84)	i) Solve the master & for a qubit SP = Yx (0xP0x - P) + Y; (0yP0y - P) + at 8 = (0zP0z - P)
Ans)	where O's are the paulis matrices ii) Show how the maximally mixed state changes after this operation:
	Given this master Eq, we want to derive a map & sulthat (t) = Ot [(0)]
	He will take 3 pauli's matrices & I (in 2-dim) as the orthonormal basis for the Hilbert space
74-	$\phi(P) = (F \cdot Y')^{\top} G$
Jon	For any map φ $F_{K,l} = \text{tr} \left[G_K \varphi \left(G_R \right) \right]$ $Y_R = \text{tr} \left[G_R \varrho \right]$
	Also, given a master eq of the form of zd(P) can
	be rewriten as: $\frac{\partial P}{\partial t} = \left[\begin{array}{c} \overline{C} \cdot r(t) \end{array} \right] \overline{G}$
	LKR = tr [GKd (GR)]
	Comparing eq (i) & eq (iv)
	Proje L · r (t) classmate PAGE PAGE



DATE Only to sox. I (ox) & = non zero. tr Sox 1(0x) = -2 (82+ 84) to Soud (0x) = tr [-2,0,0x 0x (82+84)] = -2 (1/2 + ry) +r [0= 0x 10,000 de (=)00,000 M : tr 5 g 1 (0g) 9 = -2 (1x+12) tr S 0= 1(0=) = -2 (xx+xy) tr 5 0; 2(0;) 4 = 0 tr 5 0; 1(I) 6 = 0 So L is a diagonal matrix with entires, o, -2 (ry+rz), -2 (rx+rz), & -2 (rx+rz), & -2 (rx+rz) Solving F = LF, we get $F(t) = \exp(Lt) \quad \text{as } L \text{ is a const in } t$ 8 F(0) = I.- F(t) is a diagonal matrix with entries, e° (=1), e -2(xy+xz)t | e -2(x+xy)t classmate