Linear Algebra and Formalism JEST

https://snboseplc.com/b-qm3-linear-algebra-and-formalism-jest-2/

JEST Questions

Q.No:1 JEST-2012

Consider a spin-1/2 particle in the presence of a homogeneous magnetic field of magnitude B along z-axis which is prepared initially in a state $|\Psi\rangle = \frac{1}{\sqrt{2}}(|\uparrow\rangle + |\downarrow\rangle)$ at time $t = 0$. At what time t will the particle be in the state $-|\Psi\rangle$ (μ_B is Bohr magneton)?

1. $t = \frac{\pi\hbar}{\mu_B B}$
2. $t = \frac{2\pi\hbar}{\mu_B B}$
3. $t = \frac{\pi\hbar}{2\mu_B B}$
4. Never

Q.No:2 JEST-2012

For an $N \times N$ matrix consisting of all ones,

1. all eigenvalues = 1
2. all eigenvalues = 0
3. the eigenvalues are $1, 2, ..., N$
4. one eigenvalue = N, the others = 0

Q.No:3 JEST-2013

The coordinate transformation

$$x' = 0.8x + 0.6y, \quad y' = 0.6x - 0.8y$$

represents

1. a translation.
2. a proper rotation.
3. a reflection.
4. none of the above.

Q.No:4 JEST-2013

The hermitian conjugate of the operator $-\partial/\partial x$ is

1. $\partial/\partial x$
2. $-\partial/\partial x$
3. $i\partial/\partial x$
4. $-i\partial/\partial x$

Q.No:5 JEST-2013

If the expectation value of the momentum is $\langle p\rangle$ for the wavefunction $\psi(x)$, then the expectation value of momentum for the wavefunction $e^{ikx/\hbar}\psi(x)$ is

1. k
2. $\langle p\rangle - k$
3. $\langle p\rangle + k$
4. $\langle p\rangle$

Q.No:6 JEST-2014

The Hamiltonian operator for a two-state system is given by

$$H = \alpha(|1\rangle\langle 1| - |2\rangle\langle 2| + |1\rangle\langle 2| + |2\rangle\langle 1|),$$

where α is a positive number with the dimension of energy. The energy eigenstates corresponding to the larger and smaller eigenvalues respectively are:

1. $|1\rangle - (\sqrt{2}+1)|2\rangle, |1\rangle + (\sqrt{2}-1)|2\rangle$
2. $|1\rangle + (\sqrt{2}-1)|2\rangle, |1\rangle - (\sqrt{2}+1)|2\rangle$
3. $|1\rangle + (\sqrt{2}-1)|2\rangle, (\sqrt{2}+1)|1\rangle - |2\rangle$
4. $|1\rangle - (\sqrt{2}+1)|2\rangle, (\sqrt{2}-1)|1\rangle + |2\rangle$

Q.No:7 JEST-2014

Consider a three-state system with energies E, E and $E - 3g$ (where g is a constant) and respective eigenstates

$$|\psi_1\rangle = \frac{1}{\sqrt{2}}\begin{pmatrix}1\\-1\\0\end{pmatrix}, \quad |\psi_2\rangle = \frac{1}{\sqrt{6}}\begin{pmatrix}1\\1\\-2\end{pmatrix}, \quad |\psi_3\rangle = \frac{1}{\sqrt{3}}\begin{pmatrix}1\\1\\1\end{pmatrix}.$$

If the system is initially (at $t = 0$), in state $|\psi_i\rangle = \begin{pmatrix}1\\0\\0\end{pmatrix}$, what is the probability that at a later time t system will be in state $|\psi_f\rangle = \begin{pmatrix}0\\0\\1\end{pmatrix}$

1. 0
2. $\frac{4}{9}\sin^2\left(\frac{3gt}{2\hbar}\right)$
3. $\frac{4}{9}\cos^2\left(\frac{3gt}{2\hbar}\right)$
4. $\frac{4}{9}\sin^2\left(\frac{E-3gt}{2\hbar}\right)$

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Q.No:8 JEST-2014

The operator A and B share all the eigenstates. Then the least possible value of the product of uncertainties $\Delta A \Delta B$ is

1. $\hbar$
2. 0
3. $\hbar/2$
4. Determinant(AB)

Q.No:9 JEST-2015

Consider a harmonic oscillator in the state $|\psi\rangle = e^{\frac{-|\alpha|^2}{2}} e^{\alpha a^+}|0\rangle$, where $|0\rangle$ is the ground state, a^+ is the raising operator and α is a complex number. What is the probability that the harmonic oscillator is in the n-th eigenstate $|n\rangle$?

1. $e^{-|\alpha|^2} \frac{|\alpha|^{2n}}{n!}$
2. $e^{-\frac{|\alpha|^2}{2}} \frac{|\alpha|^n}{\sqrt{n!}}$
3. $e^{-|\alpha|^2} \frac{|\alpha|^n}{n!}$
4. $e^{-\frac{|\alpha|^2}{2}} \frac{|\alpha|^{2n}}{n!}$

Q.No:10 JEST-2015

A particle moving under the influence of a potential $V(r) = \frac{kr^2}{2}$ has a wavefunction $\psi(r,t)$. If the wavefunction changes to $\psi(\alpha r, t)$, the ratio of the average final kinetic energy to the initial kinetic energy will be,

1. $\frac{1}{\alpha^2}$
2. α
3. $\frac{1}{\alpha}$
4. α^2

Q.No:11 JEST-2015

If a Hamiltonian H is given as $H = |0\rangle\langle 0| - |1\rangle\langle 1| + i(|0\rangle\langle 1| - |1\rangle\langle 0|)$, where $|0\rangle$ and $|1\rangle$ are orthonormal states, the eigenvalues of H are

1. ± 1
2. $\pm i$
3. $\pm\sqrt{2}$
4. $\pm i\sqrt{2}$

Q.No:12 JEST-2016

The Hamiltonian of a quantum particle of mass m confined to a ring of unit radius is:

$$H = \frac{\hbar^2}{2m}\left(-i\frac{\partial}{\partial\theta} - \alpha\right)^2,$$

where θ is the angular coordinate, α is a constant. The energy eigenvalues and eigenfunctions of the particle are (n is an integer):

1. $\psi_n(\theta) = \frac{e^{in\theta}}{\sqrt{2\pi}}$ and $E_n = \frac{\hbar^2}{2m}(n-\alpha)^2$
2. $\psi_n(\theta) = \frac{\sin(n\theta)}{\sqrt{2\pi}}$ and $E_n = \frac{\hbar^2}{2m}(n-\alpha)^2$
3. $\psi_n(\theta) = \frac{\cos(n\theta)}{\sqrt{2\pi}}$ and $E_n = \frac{\hbar^2}{2m}(n-\alpha)^2$
4. $\psi_n(\theta) = \frac{e^{in\theta}}{\sqrt{2\pi}}$ and $E_n = \frac{\hbar^2}{2m}(n+\alpha)^2$

Q.No:13 JEST-2016

Given a matrix $M = \begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix}$, which of the following represents $\cos(\pi M/6)$?

1. $\frac{1}{2}\begin{pmatrix} 1 & 2 \\ 2 & 1 \end{pmatrix}$
2. $\frac{\sqrt{3}}{4}\begin{pmatrix} 1 & -1 \\ -1 & 1 \end{pmatrix}$
3. $\frac{\sqrt{3}}{4}\begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$
4. $\frac{1}{2}\begin{pmatrix} 1 & \sqrt{3} \\ \sqrt{3} & 1 \end{pmatrix}$

Q.No:14 JEST-2016

The adjoint of a differential operator $\frac{d}{dx}$ acting on a wavefunction $\psi(x)$ for a quantum mechanical system is:

1. $\frac{d}{dx}$
2. $-i\hbar\frac{d}{dx}$
3. $-\frac{d}{dx}$
4. $i\hbar\frac{d}{dx}$

Q.No:15 JEST-2016

For operators P and Q, the commutator $[P, Q^{-1}]$ is:

1. $Q^{-1}[P,Q]Q^{-1}$
2. $-Q^{-1}[P,Q]Q^{-1}$
3. $Q^{-1}[P,Q]Q$
4. $-Q[P,Q]Q^{-1}$

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Q.No:16 JEST-2017

Let $\Gamma = \begin{pmatrix} 1 & 0 \\ 0 & 11 \end{pmatrix}$ and $M = \begin{pmatrix} 10 & 3i \\ -3i & 2 \end{pmatrix}$. Similarity transformation of M to Γ can be performed by

1. $\frac{1}{\sqrt{10}} \begin{pmatrix} 1 & 3i \\ 3i & 1 \end{pmatrix}$.
2. $\frac{1}{\sqrt{9}} \begin{pmatrix} 1 & -3i \\ 3i & 11 \end{pmatrix}$.
3. $\frac{1}{\sqrt{10}} \begin{pmatrix} 1 & 3i \\ -3i & 11 \end{pmatrix}$.
4. $\frac{1}{\sqrt{9}} \begin{pmatrix} 1 & 3i \\ -3i & 1 \end{pmatrix}$.

Q.No:17 JEST-2017

Consider the Hamiltonian

$$H(t) = \alpha \begin{pmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{pmatrix} + \beta(t) \begin{pmatrix} 0 & 0 & 1 \\ 0 & 0 & 0 \\ 1 & 0 & -2 \end{pmatrix}.$$

The time dependent function $\beta(t) = \alpha$ for $t \leq 0$ and zero for $t > 0$. Find $|\langle \Psi(t<0)|\Psi(t>0)\rangle|^2$, where $|\Psi(t<0)\rangle$ is the normalized ground state of the system at a time $t < 0$ and $|\Psi(t>0)\rangle$ is the state of the system at $t > 0$.

1. $\frac{1}{2}(1 + \cos(2\alpha t))$
2. $\frac{1}{2}(1 + \cos(\alpha t))$
3. $\frac{1}{2}(1 + \sin(2\alpha t))$
4. $\frac{1}{2}(1 + \sin(\alpha t))$

Q.No:18 JEST-2018

If $\psi(x)$ is an infinitely differentiable function, then $\hat{D}\psi(x)$, where the operator $\hat{D} = \exp(ax\frac{d}{dx})$, is

1. $\psi(x + a)$
2. $\psi(ae^a + x)$
3. $\psi(e^a x)$
4. $e^a \psi(x)$

Q.No:19 JEST-2018

Two of the eigenvalues of the matrix

$$A = \begin{pmatrix} a & 3 & 0 \\ 3 & 2 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

are 1 and -1. What is the third eigenvalue?

1. 2
2. 5
3. -2
4. -5

Q.No:20 JEST-2018

Consider two canonically conjugate operators $\hat{X}$ and $\hat{Y}$ such that $[\hat{X}, \hat{Y}] = i\hbar I$, where I is identity operator. If $\hat{X} = \alpha_{11}\hat{Q}_1 + \alpha_{12}\hat{Q}_2, \hat{Y} = \alpha_{21}\hat{Q}_1 + \alpha_{22}\hat{Q}_2$, where α_{ij} are complex numbers, and $[\hat{Q}_1, \hat{Q}_2] = zI$, the value of $\alpha_{11}\alpha_{22} - \alpha_{12}\alpha_{21}$ is

1. $i\hbar z$
2. $i\hbar/z$
3. $i\hbar$
4. z

Q.No:21 JEST-2018

Consider a wavepacket defined by

$$\psi(x) = \int_{-\infty}^{\infty} dk f(k) \exp[i(kx)].$$

Further, $f(k) = 0$ for $|k| > K/2$ and $f(k) = a$ for $|k| \leq K/2$. Then, the form of normalized $\psi(x)$ is

1. $\frac{\sqrt{8\pi K}}{x} \sin\frac{Kx}{2}$
2. $\sqrt{\frac{2}{\pi K}} \frac{\sin\frac{Kx}{2}}{x}$
3. $\frac{\sqrt{8\pi K}}{x} \cos\frac{Kx}{2}$
4. $\sqrt{\frac{2}{\pi K}} \frac{\sin\frac{Kx}{2}}{x}$

Q.No:22 JEST-2019

Consider two $n \times n$ matrices, A and B such that $A + B$ is invertible. Define two matrices, $C = A(A + B)^{-1}B$ and $D = B(A+B)^{-1}A$. Which of the following relations always hold true?

1. $C = D$
2. $C^{-1} = D$
3. $BCA = ADB$
4. $C \neq D$

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Q.No:23 JEST-2019

Let A be a hermitian matrix, and C and D be the unitary matrices. Which one of the following matrices is unitary?

1. $C^{-1}AC$
2. $C^{-1}DC$
3. $C^{-1}AD$
4. $A^{-1}CD$

Q.No:24 JEST-2019

Consider a 2×2 matrix $A = \begin{pmatrix} 1 & 13 \\ 0 & 1 \end{pmatrix}$. What is A^{27}?

1. $\begin{pmatrix} 1 & 13 \\ 0 & 1 \end{pmatrix}$
2. $\begin{pmatrix} 1 & 13^{27} \\ 0 & 1 \end{pmatrix}$
3. $\begin{pmatrix} 1 & 27 \\ 0 & 1 \end{pmatrix}$
4. $\begin{pmatrix} 1 & 351 \\ 0 & 1 \end{pmatrix}$

Q.No:25 JEST-2020

An $n \times n$ Hermitian matrix A is not a multiple of the identity matrix. Which one of the following statements is always true?

1. $n\text{Tr}\ (A^2) = (\text{Tr}\ A)^2$
2. $n\text{Tr}\ (A^2) < (\text{Tr}\ A)^2$
3. $n\text{Tr}\ (A^2) > (\text{Tr}\ A)^2$
4. $\text{Tr}\ (A^2) = n(\text{Tr}\ A)^2$

Q.No:26 JEST-2021

The smallest dimension of the Hilbert space in which we can find operators $\hat{x}, \hat{p}$ that satisfy $[\hat{x}, \hat{p}] = i\hbar$ is

1. 1
2. 3
3. 4
4. ∞

Q.No:27 JEST-2021

Consider the matrix $A = \begin{pmatrix} 1 & 0 & 0 & 1 \\ 0 & -2 & 0 & 0 \\ 0 & 0 & -3 & 0 \\ 1 & 0 & 0 & 4 \end{pmatrix}$. What is the determinant of the matrix $\exp(A)$?

1. 1
2. $\exp(24)$
3. 24
4. 0

Q.No:28 JEST-2022

For a one dimensional simple harmonic oscillator, for which $|0\rangle$ denotes the ground state, what is the constant β in

$$\langle 0|e^{ikx}|0\rangle = e^{-\beta\langle 0|x^2|0\rangle}?$$

1. $\beta = k^2/2$
2. $\beta = k^2$
3. $\beta = k^2/4$
4. $\beta = 2k^2$

Q.No:29 JEST-2022

Consider the differential operators given below:

$$J^+ = x^2\frac{d}{dx} + \mu x, \quad J^0 = x\frac{d}{dx} + \rho$$

that act on the set of monomials $\{x^m\}$. Here, μ and ρ are constants. Which one the following is equal to $(J^0J^+ - J^+J^0)x^m$?

1. J^+x^m
2. $mJ^+x^{(m-1)}$
3. $-(m+1)J^+x^{(m-1)}$
4. $-J^+x^m$

Q.No:30 JEST-2023

How many independent real parameters are required to describe an arbitrary $N \times N$ Hermitian matrix?

1. $N^2 - N$
2. N^2
3. $2N$
4. $N^2 - 1$

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Q.No:31 JEST-2024

Consider the rotation matrix

$$R = \begin{pmatrix} 2/3 & -1/3 & 2/3 \\ 2/3 & 2/3 & -1/3 \\ -1/3 & 2/3 & 2/3 \end{pmatrix}.$$

Let ϕ be the angle of rotation. What is the value of $\sec^2\phi$?

Q.No:32 JEST-2024

The singular matrix

$$A = \begin{pmatrix} 2 & 3 & 3 \\ 3 & 6 & 3 \\ 3 & 3 & 6 \end{pmatrix}$$

commutes with the matrix

$$B = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$$

. The eigenvalues of A are

1. $(0, 3, 11)$
2. $(0, 3, 13)$
3. $(0, 0, 12)$
4. $(0, 2, 5)$

Q.No:33 JEST-2023

A and B are 2×2 Hermitian matrices. $|a_1\rangle$ and $|a_2\rangle$ are two linearly independent eigenvectors of A. Consider the following statements:

1. If $|a_1\rangle$ and $|a_2\rangle$ are eigenvectors of B, then $[A, B] = 0$. 2. If $[A, B] = 0$, then $|a_1\rangle$ and $|a_2\rangle$ are eigenvectors of B.

Mark the correct option.

1. Statement 2 is true but statement 1 is false.
2. Statement 1 is true but statement 2 is false.
3. Both statements 1 and 2 are true.
4. Both statements 1 and 2 are false.

Q.No:34 JEST-2023

Choose the largest eigenvalue of the matrix

$$M = \begin{pmatrix} 1 & 1 & 1 & 2 & 3 \\ 12 & 2 & 3 & 2 & 1 \\ 0 & 0 & 0 & 2 & 2 \\ 0 & 0 & 3 & 0 & 3 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

1. 3
2. 5
3. 8
4. 10

Q.No:35 JEST-2025

Consider a 2×2 matrix

$$A = \begin{pmatrix} 0 & 1 \\ 1 & 1 \end{pmatrix}$$

which has eigenvalues $\lambda_1 = \frac{1+\sqrt{5}}{2}$ and $\lambda_2 = \frac{1-\sqrt{5}}{2}$. For any natural number n, which of the following is correct?

1. $A^n = \frac{1}{\sqrt{5}} \begin{pmatrix} \lambda_1^{n-1} + \lambda_2^{n-1} & \lambda_1^n - \lambda_2^n \\ \lambda_1^n - \lambda_2^n & \lambda_1^{n+1} + \lambda_2^{n+1} \end{pmatrix}$
2. $A^n = \frac{1}{\sqrt{5}} \begin{pmatrix} \lambda_1^{n-1} - \lambda_2^{n-1} & \lambda_1^n + \lambda_2^n \\ \lambda_1^n + \lambda_2^n & \lambda_1^{n+1} - \lambda_2^{n+1} \end{pmatrix}$
3. $A^n = \frac{1}{\sqrt{5}} \begin{pmatrix} \lambda_1^{n-1} - \lambda_2^{n-1} & \lambda_1^n - \lambda_2^n \\ \lambda_1^n - \lambda_2^n & \lambda_1^{n+1} - \lambda_2^{n+1} \end{pmatrix}$
4. $A^n = \frac{1}{\sqrt{5}} \begin{pmatrix} \lambda_1^{n-1} + \lambda_2^{n-1} & \lambda_1^n + \lambda_2^n \\ \lambda_1^n + \lambda_2^n & \lambda_1^{n+1} + \lambda_2^{n+1} \end{pmatrix}$

Q.No:36 JEST-2025

Given the differential operator $D \equiv \frac{d^2}{dx^2} + P\frac{d}{dx} + Q$, where P and Q are constants, what is the eigenvalue corresponding to the eigenfunction $y = e^x$?

1. $1 + P + Q$
2. $P + Q - 1$
3. $1 + Q$
4. $P + Q$

Q.No:37 JEST-2025

Consider a quantum system that is evolved sequentially with a finite sequence of Hermitian Hamiltonians $\{H_0, H_1, \ldots, H_n\}$. The full evolution operator is written as

$$O = U_n U_{n-1} \cdots U_1 U_0 = e^{-iH},$$

with $U_j = e^{-iH_j}$ and $j = 0, 1, \ldots, n$.
Then H is

1. None of the others.
2. a unitary operator.
3. a Hermitian operator.
4. undefined.

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Q.No:38 JEST-2025

The number of independent real numbers that parameterize any (3×3) Hermitian matrix is

1. 8
2. 3
3. 6
4. 9.

Q.No:39 JEST-2025

A quantum mechanical system is spanned by the eigenstates $|a_1\rangle$ and $|a_2\rangle$ of a Hermitian operator A with eigenvalues a_1 and a_2 respectively. If there is no degeneracy, what is the expectation value of the operator $(A-a_1)(A-a_2)$ in the state

$$\frac{|a_1\rangle + |a_2\rangle}{\sqrt{2}}?$$

1. 0
2. $\frac{(a_2-a_1)(a_1-a_2)}{2}$
3. 1
4. $(a_2-a_1)(a_1-a_2)$

Q.No:40 JEST-2025

A 3×3 matrix M satisfies $M^2 - 3M + 2I = 0$. Find the determinant of the matrix M if its trace is 6.

Q.No:41 JEST-2026

For two Pauli matrices σ_1, σ_2, what is the value of the expression $\text{Det}(\sigma_1^{7641}) - \text{Trace}(\sigma_2^{7641})$? The Pauli matrices are given as: $\sigma_1 = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$, $\sigma_2 = \begin{pmatrix} 0 & -i \\ i & 0 \end{pmatrix}$.

1. -1
2. -11
3. 11
4. 1

Q.No:42 JEST-2026

Let A and B be two operators. Consider the operator $\hat{C} = [\hat{A} + \hat{A}^\dagger, \hat{B}\hat{B}^\dagger]$, where $[\hat{X}, \hat{Y}]$ represents the commutator between the operators $\hat{X}$ and $\hat{Y}$. Which of the following statements about $\hat{C}$ is true?

1. $\hat{C}$ is Hermitian if both $\hat{A}$ and $\hat{B}$ are Hermitian.
2. $\hat{C}$ is always Hermitian.
3. $\hat{C}$ is anti-Hermitian.
4. $\hat{C}$ is Hermitian if $\hat{A}$ is Hermitian and $\hat{B}$ is anti-Hermitian.

Q.No:43 JEST-2026

Consider a state $|\lambda\rangle = e^{\lambda a^\dagger}|0\rangle$ defined in a one-dimensional harmonic oscillator such that $a|\lambda\rangle = \lambda|\lambda\rangle$. Here a and $a^\dagger$ are the annihilation and creation operators, respectively, and $|0\rangle$ is the ground state. What is $\langle\lambda_1|\lambda_2\rangle$?

1. 0
2. $e^{\lambda_1^* \lambda_2}$
3. $\delta(\lambda_1 - \lambda_2)$ (complex δ-function)
4. $e^{\lambda_1^* + \lambda_2}$

Q.No:44 JEST-2026

Which of the following Hamiltonians correctly represents a one-dimensional simple harmonic oscillator of mass m, frequency ω and potential at $x = a$?

1. $H = -\frac{\hbar^2}{2} m\omega^2 \frac{\partial^2}{\partial p^2} + \frac{p^2}{2m} + \frac{1}{2}m\omega^2 a^2 - i\hbar m\omega^2 a \frac{\partial}{\partial p}$
2. $H = -\frac{\hbar^2}{2} m\omega^2 \frac{\partial^2}{\partial p^2} + \frac{p^2}{2m} + \frac{1}{2}m\omega^2 a^2$
3. $H = -\frac{\hbar^2}{2m} \frac{\partial^2}{\partial p^2} + \frac{1}{2}m\omega^2 (p-a)^2$
4. $H = -\frac{\hbar^2}{2} m\omega^2 \frac{\partial^2}{\partial p^2} + \frac{p^2}{2m} + \frac{1}{2}m\omega^2 a^2 + i\hbar m\omega^2 a \frac{\partial}{\partial p}$

Q.No:45 JEST-2026

In a two-dimensional Hilbert space, two Hermitian non-commuting operators A and B have non-degenerate normalized eigenstates, which satisfy $A|\psi_A^i\rangle = a_i|\psi_A^i\rangle$ and $B|\psi_B^i\rangle = b_i|\psi_B^i\rangle$, respectively, where $i = 1, 2$. The relations $|\psi_A^1\rangle = \frac{1}{\sqrt{5}}|\psi_B^1\rangle + \frac{2}{\sqrt{5}}|\psi_B^2\rangle$, $|\psi_B^1\rangle = \frac{1}{\sqrt{5}}|\psi_A^1\rangle - \frac{2}{\sqrt{5}}|\psi_A^2\rangle$ are given. After a measurement of B is done on the state $|\psi_A^2\rangle$, what is the percentage probability of finding the system in the state $|\psi_A^1\rangle$?

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Question No.	Entrance with year	Answer
1	JEST-2012	b
2	JEST-2012	d
3	JEST-2013	c
4	JEST-2013	a
5	JEST-2013	c
6	JEST-2014	b
7	JEST-2014	b
8	JEST-2014	b
9	JEST-2015	a
10	JEST-2015	c
11	JEST-2015	c
12	JEST-2016	a
13	JEST-2016	b
14	JEST-2016	c
15	JEST-2016	b
16	JEST-2017	a
17	JEST-2017	a
18	JEST-2018	c
19	JEST-2018	b
20	JEST-2018	b
21	JEST-2018	a
22	JEST-2019	a
23	JEST-2019	b
24	JEST-2019	d
25	JEST-2020	c
26	JEST-2021	d
27	JEST-2021	a
28	JEST-2022	a
29	JEST-2022	a
30	JEST-2023	2
31	JEST-2024	Ans 4
32	JEST-2024	1
33	JEST-2023	2
34	JEST-2023	b
35	JEST-2025	3
36	JEST-2025	1
37	JEST-2025	3
38	JEST-2025	4
39	JEST-2025	1
40	JEST-2025	Ans 6
41	JEST-2026	1
42	JEST-2026	3
43	JEST-2026	2
44	JEST-2026	1
45	JEST-2026	Ans 32

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