PHYSICS ACADEMY
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SUBJECT – MATHEMATICAL PHYSICS

CLASS ROOM TEST–01

"CSIR-NET/JRF JUNE-2021"

For –

- ☞ **CSIR-NET/JRF**
- ☞ **GATE / JEST**
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14, RAIPUR ROAD, NEAR SURVEY CHOWK, DEHRADUN CONTACT:- +919045460409, +919870827730 website:- www.careerspectra.in

MATHEMATICAL PHYSICS

CLASS ROOM TEST-01

Q1. Let A be a 3× 3 matrix such that det (A) = -2, then det ($-2A^1$) is equal to.
(a) 4 (b) -4 (c) 8 (d) -2

Q2. If A = $\begin{bmatrix}1 & \alpha\\ 0 & 1\end{bmatrix}$ (where $\alpha > 0$), the sum of the following infinite series, will be.
Trace (A) + Trace $\left(\frac{A}{2}\right) + Trace\left(\frac{A^2}{2^2}\right) + Trace\left(\frac{A^3}{2^3}\right) + \cdots$
(a) 2 (b) -2 (c) 4 (d) 8

Q3. If the matrix A = $\begin{bmatrix}0 & 2y & z\\ x & y & -z\\ x & -y & z\end{bmatrix}$ is orthogonal in nature, then the possible value x,y,z will be.
(a) x = $\pm\frac{1}{\sqrt{6}}, y = \pm\frac{1}{\sqrt{6}}, z = \pm\frac{1}{\sqrt{3}}$, (b) x = $\pm\frac{1}{\sqrt{6}}, y = \pm\frac{1}{\sqrt{2}}, z = \pm\frac{1}{\sqrt{3}}$,
(c) x = $\pm\frac{1}{\sqrt{3}}, y = \pm\frac{1}{\sqrt{2}}, z = \pm\frac{1}{\sqrt{6}}$, (d) x = $\pm\frac{1}{\sqrt{2}}, y = \pm\frac{1}{\sqrt{6}}, z = \pm\frac{1}{\sqrt{3}}$,

Q4. Let A = $\begin{bmatrix}a & b\\ c & d\end{bmatrix}$, be a 2x2 matrix where *a,b,c,d* $\epsilon[0,1]$ and λ_1 , λ_2 are Eigen value of the matrix A. The number of such matrices for which $\lambda_1\lambda_2 \neq 0$, is.
(a) 5 (b) 6 (c) 7 (d) 8

Q5. Let A = $\begin{bmatrix}1 & 2 & 1\\ 0 & 1 & -1\\ 3 & 1 & 1\end{bmatrix}$, The sum of all values of λ for which three exists of a column vector X $\neq 0$ such that AX = λX, is
(a) 0 (b) 1 (c) 2 (d) 3

Q6. Let λ_i (I = 1,2,3) be the Eigen values of the matrix. The sum $\sum_{i=1}^{3}\lambda_i^2$ is equal to
$\begin{bmatrix}2 & -1 & -3\\ -1 & 1 & 2\\ -3 & 2 & 3\end{bmatrix}$
(a) 14 (b) 42 (c) 6 (d) 0

Q7. The inverse of the matrix M = $\begin{pmatrix}0 & 1 & 1\\ 0 & 0 & 1\\ 1 & 0 & 0\end{pmatrix}$ is
(a) M –I (b) M^2 –I (c) I-M^2 (d) I – M
Where I is the identity matrix.

Q8. The exponential of the matrix M = $\begin{bmatrix}-1 & 0\\ 0 & -1\end{bmatrix}$ will be.
(a) $\frac{1}{2}\left(e+\frac{1}{e}\right)I + \frac{1}{2}\left(e-\frac{1}{e}\right)M$ (b) $\left(e+\frac{1}{e}\right)I + \left(e-\frac{1}{e}\right)M$
(c) $\left(e^2+\frac{1}{e^2}\right)I + \left(e^2-\frac{1}{e^2}\right)M$ (d) $\frac{1}{2}\left(e^2+\frac{1}{e^2}\right)I + \frac{1}{2}\left(e^2-\frac{1}{e^2}\right)M$

Q9. The value of 'a' for which the system of equations has a non-zero solution, is equal to
$a^2x + (a+1)^3y + (a+2)^3z = 0$
$ax + (a+1)y + (a+2)z = 0$
$x + y + z = 0$
(a) 1 (b) 0 (c) -1 (d) None of these

Q10. For the given set of equations:

$$x + y = 1; m\,y + z = 1;\ x + z = 1,$$

Which one of the following statements is correct?

(a) Equations are inconsistent

(b) Equations are consistent and a single non-trivial solutions exists

(c) Equations are consistent and many solutions exist.

(d) Equations are consistent and only a trivial solution exists

ANSWER-KEY

1.	A	2.	C	3.	D	4.	B	5.	D
6.	B	7.	D	8.	A	9.	C	10.	B