

**B.SC. PHYSICS
SECOND SEMESTER
MATHEMATICAL PHYSICS II
BSP – 202 [REPEAT]
[USE OMR FOR OBJECTIVE PART]**

**SET
A**

Duration: 1:30 hrs.

Full Marks: 35

Time: 15 mins.

(Objective)

Marks: 10

Choose the correct answer from the following:

1×10=10

- The element a_{21} in the matrix $A = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$ will be
 - 1
 - 1
 - 3
 - 2
- If $A = \begin{pmatrix} 3 & -2 \\ 1 & 0 \end{pmatrix}$ then $2a_{21} + a_{12}$ will be
 - 1
 - 2
 - 0
 - 3
- If $A = (a_{ij})_{2 \times 2} = \begin{pmatrix} 2 & 1 \\ -1 & 5 \end{pmatrix}$ then the co-factor of a_{22} will be
 - 1
 - 1
 - 2
 - 5
- If $A = \begin{pmatrix} 0 \\ -1 \end{pmatrix}$ and $B = (2 \ 1)$, then BA will be
 - 0
 - 1
 - 1
 - 2
- If $A = \begin{pmatrix} 1 & -1 \\ -2 & 3 \end{pmatrix}$ and $\det(A)$ will be
 - 1
 - 2
 - 1
 - 3
- If $A = \begin{pmatrix} 1 & -1 \\ -2 & 2 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 1 \\ 2 & 0 \end{pmatrix}$, then $\frac{1}{2}(A + B)$ will be a matrix of what?
 - $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$
 - $\begin{pmatrix} 0 & 2 \\ 2 & 0 \end{pmatrix}$
 - $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$
 - $\begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$

7. If $I_{2 \times 2}$ is a Identity matrix, then its trace will be
a. 0
b. 1
c. 2
d. -1
8. If A is a square matrix, then $(A^T)^T$ will be
a. A^T
b. A^{-1}
c. A
d. A^θ
9. If A is a square matrix and λ is a scalar, then $(\lambda A)^\theta$ will be
a. A^θ
b. λA^T
c. λA
d. λA^θ
10. If $A = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$ then its transpose A^T will be
a. A
b. $-A$
c. $2A$
d. A^{-1}

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(Descriptive)

Time : 1 hr. 15 min.

Marks : 25

[Answer question no.1 & any two (2) from the rest]

1. For the matrix $A = \begin{pmatrix} 2 & -1 \\ 3 & 5 \end{pmatrix}$, find its co-factor and determinant. 5

2. a. What do you mean by a symmetric and skew-symmetric matrix? 4+6=10
b. Show that any square matrix can be expressible in terms of its symmetric and skew-symmetric parts.

3. a. If $I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ and $C = \begin{pmatrix} 0 & 1 \\ 0 & 0 \end{pmatrix}$, show that $(aI + bC)^3 = a^3I + 3a^2bC$. 5+5=10
b. If $A = \begin{pmatrix} 4 & 2 \\ -1 & 1 \end{pmatrix}$, find $(A - I)(A - 2I)$.

4. a. If $A = \begin{pmatrix} 3 & -4 \\ 1 & -1 \end{pmatrix}$, then show that $A^n = \begin{pmatrix} 1 + 2n & -4n \\ n & 1 - 2n \end{pmatrix}$ for any positive integer n . 5+5=10
b. If $A = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$, then find the expression $A^2 - 2A + I$.

5. a. What do you mean by Hermitian matrix? If A is a skew-Hermitian matrix then show that iA is Hermitian. 4+3+3
=10
b. Find transpose conjugate of the following matrices
(i) $\begin{pmatrix} 1 & 2 + 3i \\ 2 - 3i & -2 \end{pmatrix}$ (ii) $\begin{pmatrix} 1 + i & -1 + 2i \\ 1 - i & 2 \end{pmatrix}$

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