

- Instructions:**
- Please attempt Section-A on the MCQs Answer Sheet only.
 - Only black ball point or marker may be used for shading the relevant circle.
 - Please make sure that there is no cutting, over writing, erasing, or multiple circles shading.

Time Allowed: 20 Minutes

"Section-A"

Marks: 20

Q.1. Choose the correct option i.e. A, B, C or D.

- $i^{57} + \frac{1}{i^{25}}$ when simplified has the value
(A) 0 (B) $2i$ (C) $-2i$ (D) 2
- If $|A| = 47$, then find $|A^t|$
(A) 0 (B) 47 (C) -47 (D) None
- Evaluate $\sum (3 + 2^r)$, where $r = 1, 2, 3, \dots, 10$
(A) 2049 (B) 2051 (C) 2076 (D) None
- If $f(x) = x^3 - \frac{1}{x^3}$, then $f(x) + f\left(\frac{1}{x}\right) = \dots\dots\dots$
(A) -1 (B) 0 (C) x^3 (D) None
- $\sin\left(x - \frac{\pi}{2}\right) = \dots\dots\dots$
(A) $\sin x$ (B) $-\sin x$ (C) $\cos x$ (D) $-\cos x$
- If θ be the angle between any two vectors $\vec{a}$ and $\vec{b}$, then $|\vec{a} \cdot \vec{b}| = |\vec{a} \times \vec{b}|$, when θ is equal to
(A) 0 (B) π (C) $\frac{\pi}{2}$ (D) $\frac{\pi}{4}$
- The projection of the vector $2\vec{i} + 3\vec{j} - 2\vec{k}$ on the vector $\vec{i} + 2\vec{j} + 3\vec{k}$ is
(A) $\frac{3}{\sqrt{14}}$ (B) $\frac{2}{\sqrt{14}}$ (C) $\frac{1}{\sqrt{14}}$ (D) None of these
- The sum to 200 terms of the series $1 + 4 + 6 + 5 + 11 + 6 + \dots$ is
(A) 20,300 (B) 29,800 (C) 30,200 (D) None of these
- Find the sum of 3 geometric means between $1/3$ and $1/48$ ($r > 0$).
(A) $1/4$ (B) $5/24$ (C) $7/24$ (D) $1/3$
- In how many different ways can 5 couples be seated around a circular table if the couples must not be separated?
(A) 768 (B) 724 (C) 844 (D) 696
- How many diagonals can be drawn in a plane figure of 8 sides?
(A) 20 (B) 21 (C) 35 (D) 81
- What is the middle term in the expansion of $(2x + 5y)^4$?
(A) $6x^2y^2$ (B) $600x^2y^2$ (C) $120xy^2$ (D) $5000xy^3$
- Sums of coefficients of last 15 terms in expansion of $(1+x)^{29}$ is
(A) 2^{15} (B) 2^{28} (C) 2^{29} (D) 2^{30}
- What is the domain of $f(x) = \sqrt{\frac{2-x}{x+2}}$?
(A) $[-4, -2)$ (B) $[0, 2] - \{1\}$ (C) $(-2, 2)$ (D) None of these
- If $\tan 15^\circ = 2 - \sqrt{3}$, then the value of $\cot^2 75^\circ$ is
(A) $7 + \sqrt{3}$ (B) $7 - 2\sqrt{3}$ (C) $7 - 4\sqrt{3}$ (D) $7 + 4\sqrt{3}$
- In right triangle ABC, find b if $a = 2$, $c = 5$ and $r = 90^\circ$
(A) 3 (B) 7 (C) $\sqrt{21}$ (D) $\sqrt{29}$
- With usual notations $r_1 r_2 r_3 = \dots\dots\dots$
(A) Δ (B) Δ^2 (C) $\frac{abc}{\Delta}$ (D) $\frac{\Delta}{abc}$
- $\sum_{j=1}^n j = \dots\dots\dots$
(A) $\frac{n(n+1)(2n+1)}{2}$ (B) $\frac{n(n+1)}{2}$ (C) $\frac{n(n+1)(2n+1)}{6}$ (D) None of these
- $\tan^{-1} \sqrt{3} - \sec^{-1}(-2) = \dots\dots\dots$
(A) π (B) $-\pi/3$ (C) $\pi/3$ (D) $2\pi/3$
- If α, β, γ are the direction angles of $\vec{r}$, then $\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma = \dots\dots\dots$
(A) -1 (B) 1 (C) 0 (D) None of these