

Series-A

Roll No.....

(GRAPH PAPER)

Total No. of Questions-34]

[Total No. of Printed Pages-16

A-857-A-XII-2325

MATHEMATICS

Time Allowed—3 Hours

Maximum Marks—80

Candidates are required to give their answers in their own words as far as practicable.

Marks allotted to each question are indicated against it.

Special Instructions :

- (i) You must write Question Paper Series in the circle at the top left side of title page of your Answer-book.
- (ii) While answering your Questions, you must indicate on your Answer-book the same Question No. as appears in your Question Paper.

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- (iii) Do not leave blank page/pages in your Answer book.
- (iv) All questions are compulsory.
- (v) This question paper contains four sections A, B, C, & D. Each section is compulsory.
- (vi) Section-A has 13 MCQ (Multiple Choice Questions) and 3 Assertion, Reason based questions of 1 mark each.
- (vii) Section-B has 12 Very Short answer questions of 3 marks each i.e. Question Nos. 17 to 28.
- (viii) Section-C has 2 Short answer questions of 4 marks each i.e. Question Nos. 29 & 30.
- (ix) Section-D has 4 Long answer questions of 5 marks each i.e. Question Nos. 31 to 34.
- (x) Graph paper must be attached in between the Answer-book.
- (xi) All questions given in Section-A (Multiple Choice Questions) are to be attempt on OMR sheet provided with Answer book.

SECTION-A

1. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined as $f(x) = x^4$. Choose the correct answer :

1

- (a) f is one-one onto
- (b) f is many-one onto
- (c) f is one-one but not onto
- (d) f is neither one-one nor onto.

2. If $\cot^{-1} x = y$, then :

1

- (a) $0 < y < \pi$
- (b) $0 \leq y < \frac{\pi}{2}$
- (c) $0 \leq y \leq \frac{\pi}{2}$
- (d) $0 \leq y \leq \pi$.

3. The value of $\sin\left[\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right]$ is equal to:

1

- (a) $\frac{1}{2}$
- (b) $\frac{1}{3}$
- (c) $\frac{1}{4}$
- (d) 1.

4. Matrices A and B will be inverse of each other only if 1

- (a) $AB = BA$
- (b) $AB = BA = O$
- (c) $AB = O, BA = I$
- (d) $AB = BA = I.$

5. The matrix $B = [a_{ij}]_{1 \times n}$, when $n > 1$ is : 1

- (a) Square matrix
- (b) Column matrix
- (c) Diagonal matrix
- (d) Row matrix.

6. The derivative of e^{-nx} w.r.t. 'x' is : 1

- (a) $-ne^{-nx}$
- (b) ne^{-nx}
- (c) $-ne^{nx}$
- (d) $ne^{nx}.$

7. The function $f(x) = \log x$ is : 1

- (a) Strictly increasing on $(0, \infty)$

- (b) Strictly decreasing on $(0, \infty)$
- (c) Neither increasing nor decreasing on $(0, \infty)$
- (d) None of these.

8. The rate of change of area of a circle w.r.t. its radius 'r' when $r = 5$ cm is : 1

- (a) $8\pi \text{ cm}^2 / \text{cm}$
- (b) $10\pi \text{ cm}^2 / \text{cm}$
- (c) $9\pi \text{ cm}^2 / \text{cm}$
- (d) $16\pi \text{ cm}^2 / \text{cm}$.

9. $\int \sin^3 x \cdot \cos^2 x \, dx$ is equal to : 1

- (a) $-\frac{2}{3}\sin^3 x + \frac{1}{4}\sin x + C$
- (b) $\frac{\sin^4 x}{4} + \frac{\cos^3 x}{3} + C$
- (c) $-\frac{1}{3}\cos^3 x + \frac{1}{5}\cos^5 x + C$
- (d) None of these.

10. The degree of differential equation

$$2x^2 \left(\frac{d^2y}{dx^2} \right) - 3 \frac{dy}{dx} + y = 0 \text{ is :} \quad 1$$

- (a) 2 (b) 1
(c) 0 (d) Not defined.

11. The integrating factor of $ydx - (x + 2y^2)dy = 0$ is : 1

- (a) $\frac{1}{y^2}$ (b) $-\frac{1}{y}$
(c) $\frac{1}{y}$ (d) y .

12. The projection of the vector $\vec{a} = 2\hat{i} + 3\hat{j} + 2\hat{k}$ on the vector $\vec{b} = \hat{i} + 2\hat{j} + \hat{k}$ is : 1

- (a) $\frac{10}{\sqrt{6}}$ (b) $\frac{-10}{\sqrt{6}}$
(c) $\frac{5}{\sqrt{6}}$ (d) $\frac{-5}{\sqrt{6}}$.

13. The relation between direction Cosines l , m and n of a line is : 1

(a) $l^2 + m^2 + n^2 = 1$

(b) $l^2 + m^2 + n^2 = -1$

(c) $l^2 + m^2 + n^2 = 0$

(d) $l^2 + m^2 + n^2 = \frac{1}{\sqrt{2}}$

Assertion Reason based Questions

In the following questions, a statement of Assertion(A) is followed by a statement of Reason(R). Choose the correct answer out of the following from (Question No. 14 to 16) :

14. Assertion (A): The line $\vec{r} = \vec{a}_1 + \lambda \vec{b}_1$ and $\vec{r} = \vec{a}_2 + \mu \vec{b}_2$ are perpendicular when $\vec{b}_1 \cdot \vec{b}_2 = 0$. 1

Reason (R): The angle ' θ ' between the line $\vec{r} = \vec{a}_1 + \lambda \vec{b}_1$ and $\vec{r} = \vec{a}_2 + \mu \vec{b}_2$ is

$$\text{given by } \cos \theta = \frac{|\vec{b}_1 \cdot \vec{b}_2|}{|\vec{b}_1| |\vec{b}_2|}$$

Options:

- (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)
- (b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A)
- (c) Assertion (A) is true, but Reason (R) is false.
- (d) Both Assertion (A) and Reason (R) are false.

15. Assertion (A): Let A and B be two events such

that $P(A) = \frac{1}{5}$ while

$P(A \text{ or } B) = \frac{1}{2}$. Let $P(B) = p$,

then for $p = \frac{3}{8}$, A and B are independent. 1

Reason (R): For independent events

$$P(A \cap B) = P(A) \cdot P(B)$$

then $P(A \cup B) =$

$$P(A) + P(B) - P(A) \cdot P(B)$$

