

PRACTICE PAPER 1

Section-1

Straight Objective Type

This section contains 9 multiple choice question numbered 1 to 9. Each question has 4 choices (a), (b), (c) and (d), out of which ONLY ONE is correct.

Q 1

The number of odd positive integers smaller than or equal to 10,000 which are divisible neither by 3 nor by 5 is

- a. 3,332
- b. 2,666
- c. 2,999
- d. 3,665

Q 2

The number of ways in which three distinct numbers in A.P. can be selected from 1, 2, , 24 is

- a. 144
- b. 276
- c. 572
- d. 132

Q 3

Number of real roots of the equation $8x^3 - 6x + 1 = 0$ lying between -1 and 1 is

- a. 0
- b. 1
- c. 2
- d. 3

Q 4

The remainder $R(x)$ obtained by dividing the polynomial x^{100} by the polynomial $x^2 - 3x + 2$ is

- a. $2^{100} - 1$
- b. $(2^{100} - 1)x - 2(2^{99} - 1)$
- c. $2^{100}x - 3 \cdot 2^{100}$
- d. $(2^{100} - 1)x + 2(2^{99} - 1)$

Q 5

The angles of a triangle are in A.P. and the ratio of the greatest to the smallest angle is 3: 1 then the smallest angle is

- a. $\frac{\pi}{6}$
- b. $\frac{\pi}{3}$
- c. $\frac{\pi}{4}$
- d. None of the above

Q 6

The least value of $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$ for positive x, y, z satisfying the condition $x + y + z = 9$ is

- a. $15/7$
- b. $1/9$
- c. 3
- d. 1

Q 7

Let r be the length of the chord intercepted by the ellipse $9x^2 + 16y^2 = 144$ on the line $3x + 4y = 12$. Then

- a. $r = 5$
- b. $r > 5$
- c. $r = 3$
- d. $r = \sqrt{7}$

Q 8

A segment AB of length a moves with its ends on the axes. Then the locus of the point P which divides the line in the ratio $1:2$ is

- a. $2x^2 - 2x + 3y = 0$
- b. $9(x^2 + 4y^2) = 4a^2$
- c. $9(y^2 + 4x^2) = 4a^2$
- d. $9x^2 + 4y^2 = a^2$

Q 9

If $2 \sec 2\alpha = \tan \beta + \cot \beta$, then one possible value of $\alpha + \beta$ is

- a. $\frac{\pi}{2}$
- b. $\frac{\pi}{4}$
- c. $\frac{\pi}{3}$
- d. 0

Section-II**Assertion-Reason Type****Q 10**

Statement -1: The least period of the function $\sin x - [\sin x]$ is 1. because

Statement -2: The least period of the function $x - (x)$ is unity.

- a. Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1
- b. Statement-1 is True, Statement-2 is True; Statement-2 is not a correct explanation for Statement-1
- c. Statement-1 is True, Statement-2 is False
- d. Statement-1 is True, Statement-2 is True

Q 11

Statement -1: The $f(x) \sin |x|$ is differentiable everywhere. because

Statement -2: If $f(x)$ is continuous zero, then $x f(x)$ is differentiable at zero.

- Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1
- Statement-1 is True, Statement-2 is True; Statement-2 is not a correct explanation for Statement-1
- Statement-1 is True, Statement-2 is False
- Statement-1 is True, Statement-2 is True

Q 12

Statement -1: If three points A, B, C in space are collinear then vectors $\overrightarrow{OA}, \overrightarrow{OB}, \overrightarrow{OC}$ (O origin) are essentially coplanar. because

Statement -2: There is only one plane through three collinear points in space.

- Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1
- Statement-1 is True, Statement-2 is True; Statement-2 is not a correct explanation for Statement-1
- Statement-1 is True, Statement-2 is False
- Statement-1 is True, Statement-2 is True

Q 13

Statement -1: The circle $x^2 + y^2 = 2ax$ and the parabola $y^2 = ax (a > 0)$ cut at a point P in first quadrant. The distance of the point P from focus of the parabola must be because

Statement -2: The focus distance of any point $P (x_1, y_1)$ on the parabola $y^2 = 4ax$ is $x_1 + a$.

- Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1
- Statement-1 is True, Statement-2 is True; Statement-2 is not a correct explanation for Statement-1
- Statement-1 is True, Statement-2 is False
- Statement-1 is True, Statement-2 is True

Section-III

Linked Comprehension Type

M₁₄₊₁₆: Paragraph for Question Nos. 14 to 16

Consider the equation $\log_a x = x$, where $x > 0, a > 0, a \neq 1$

Q 14

The equation $\log_a x = x$

- has no solution essentially
- has one solution essentially
- has two solution essentially
- None of the above

Q 15

For $a > e^{1/e}$, the equation $\log_a x = x$

- has no solution essentially
- has one solution essentially
- has two solution essentially
- None of the above

Q 16

For $a = e^{1/e}$, the equation $\log_a x = x$

- a. has no solution essentially
- b. has one solution essentially
- c. has two solution essentially
- d. None of the above

M₁₇₋₁₉: Paragraph for Question Nos. 17 to 19

Consider the curve given by parametric equation $x = t - t^3, y = 1 - t^4, -\infty < t < \infty$.

Q 17

The curve cuts y-axis at

- a. one point
- b. two points
- c. three points
- d. four points

Q 18

The curve is Symmetrical about

- a. x-axis
- b. y-axis
- c. $y = x$
- d. none of these

Q 19

The curve forms a loop area

- a. 8/35
- b. 16/35
- c. 31/35
- d. None of the above

Section-IV**Matrix-Match Type****Q 20**

if $y = \cos^{-1} \left(\frac{a \cos x + b}{a + b \cos x} \right) - 2 \tan^{-1} \left(\sqrt{\frac{a-1}{a+b}} \tan \frac{x}{2} \right)$, then match the following:

Column I

- a. y
- b. y at 0
- c. $\frac{dy}{dx}$
- d. $\frac{d^2y}{dx^2}$

Column II

- (p) 0
- (q) 1
- (r) $\frac{a}{\sqrt{a^2+b^2}}$
- (s) $\frac{b}{\sqrt{a^2+b^2}}$

Q 21

Match the following remainders, when 7^{1000} divided by 2, 3, 5 and 11

Column I

- a. 2
- b. 3
- c. 5
- d. 11

Column II

- (p) 4
- (q) 3
- (r) 2
- (s) 1

Q 22

If $2 \sin 2^\circ + 4 \sin 4^\circ + 6 \sin 6^\circ + \dots + 178 \sin 178^\circ = A \cot(Bx^\circ + C) + D$, where A, B, C, D are numerical quantities, then match the following :

Column I

- a. A
- b. B
- c. C
- d. D

Column II

- (p) 0
- (q) 1
- (r) 180
- (s) 90