

MATHEMATICS 2022

TIME: 3 Hours

(100 Marks)

SECTION 'A' (Multiple Choice Questions)(40)

1. Choose the correct answer for each from the given options:

(i) The general term of the sequence 1-2, 2-3, 3-4, is:

- * $n + 1$ * $n(n + 1)$ ✓ * $n(n + 2)$

(ii) A real value function $f(x) = x + x^3$ is a/an:

- * Even function * Odd function ✓
* Composite function * Neither even nor odd function

(iii) $\lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n$ is equal to:

- * 1 * $\frac{1}{e}$ * e ✓ * $-e$

(iv) $\lim_{x \rightarrow \infty} \frac{x^2 - 4}{x - 2}$

- * 0 * 1 * 2 * 4 ✓

(v) Slope of a vertical line is:

- * 0 * 1 * -1 * ∞ ✓

(vi) If the lines $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ are perpendicular, then:

- * $a_1b_2 - a_2b_1 = 0$ * $a_1b_1 + a_2b_2 = 0$ * $a_1b_1 - a_2b_2 = 0$ ✓

(vii) Slope of the line perpendicular to the line $2x - y + 3 = 0$ is:

- * 2 * $\frac{1}{2}$ * $-\frac{1}{2}$ ✓ * -2

(viii) The equation $x \left(\frac{1}{2}\right) + y \left(\frac{\sqrt{3}}{2}\right) = 2$ is in perpendicular form, then the value of $\sin \alpha$ is:

- * $\frac{\sqrt{3}}{2}$ ✓ * $\frac{1}{2}$ * $\frac{1}{\sqrt{3}}$ * $\frac{2}{\sqrt{3}}$

(ix) The point of concurrency of the internal bisectors of angles of a triangle is called:

- * orthocenter * incentre ✓ * centroid * circumcenter

(x) If A, B and C are collinear points then area of triangle ABC is:

- * Zero ✓ * Positive * Negative * infinite

(xi) Every linear equation represents a/an:

- * Straight line ✓ * Circle * Parabola * Ellipse

(xii) The inclination of a line is 135° , then slope is:

- * 1 * $\sqrt{3}$ * 0 * -1 ✓

(xiii) Two lines represented by $ax^2 + 2hxy + by^2 = 0$ will be orthogonal if:

- * $a + b = 0$ ✓ * $a = b$ * $a + b = 1$ * $ab = 0$

(xiv) The centroid of a triangle divides the median internally in the ratio of:

- * 1 : 2 * 3 : 2 * 2 : 1 ✓ * 2 : 2

(xv) An equation including $\frac{dy}{dx}$ is called:

- * Polynomial Equation * Differential Equation ✓
* Exponential Equation * Logarithmic Equation

(xvi) If $f(x) = \tan^{-1} 2x$ then $f(x) =$

- * $\frac{1}{1+x^2}$ * $\frac{1}{4+x^2}$ * $\frac{2}{1+4x^2}$ ✓ * $\frac{2}{4+x^2}$

(xvii) The slope of tangent to the curve $y = x^2 + 2x + 3$ at (1, 2) is:

- * 0 * 2 * 4 ✓ * 6

(xviii) If $S = 9\sqrt{t}$ is the relation between distance and time, then speed at $t = 1$ is:

- * $\frac{9}{2}$ ✓ * $\frac{2}{9}$ * $\frac{1}{18}$ * $-\frac{2}{9}$

(xix) If $y = \sin^{-1} 2x$, then its derivative is:

- * $\frac{-2}{\sqrt{1-4x^2}}$ * $\frac{2}{\sqrt{1-4x^2}}$ ✓ * $\frac{-2}{\sqrt{1+4x^2}}$ * $\frac{2}{\sqrt{1+4x^2}}$

(xx) If $y = x^3 + 4$, then $\frac{d^2y}{dx^2} =$:

- * $3x^2$ * 6 * $3x$ * $6x$ ✓

(xxi) The necessary condition for function $f(x)$ to have extreme value is:

- * $f'(x) = 0$ * $f(x) = 0$ ✓ * $f'(x) = 1$ * $f''(x) = 1$

(xxii) Anti-derivative of zero is:

- * Zero * Constant ✓ * x * 1

(xxiii) $\int \frac{dx}{2x+3} =$

- * $2 \ln(2x+3) + C$ * $\frac{1}{2} \ln(2x+3) + C$ ✓
* $\ln(2x+3) + C$ * $3 \ln(2x+3) + C$

(xxiv) $\int \ln e^x dx =$

- * $ex + C$ * $\ln ex + C$ * $\frac{x^2}{2} + C$ ✓ * $\ln x + C$

(xxv) $\int x^p dx =$ when $p \neq -1$:

- * $\frac{x^{p+1}}{p+1} + C$ ✓ * $px^{p-1} + C$ * $\frac{x^{p-1}}{p-1} + C$ * $px^{p+1} + C$

(xxvi) $\int \tan x \sec^2 x dx =$

- * $\frac{1}{2} \tan^2 x + C$ ✓ * $\frac{1}{3} \tan^2 x + C$
* $\frac{1}{2} \sec^2 x + C$ * $\frac{1}{3} \sec^2 x + C$

(xxvii) $\int e^{x^2} 2x dx =$

- * $e^{x^2} + C$ ✓ * $\frac{e^{x^2}}{2} + C$ * $2e^{x^2} + C$ * $\frac{e^{x^2}}{2x} + C$

(xxviii) Formula for area above the x-axis, under the curve is:

- * $\int_a^b y dx$ ✓ * $\int_a^b x dx$ * $\int_a^b y dy$ * $\int_a^b x dy$

(xxix) The centre of the circle $x^2 + y^2 + 4x + 2y - 3 = 0$ is

- * (-2, 1) * (-2, -1) ✓ * (2, -1) * (1, 2)