Section-A

Mulitple Choice Questions (MCQ's)

Q.1: Choose the correct answer for each form the given options:

(i) The function defined by $f(x) = |x|$ is called:
(a) Rational function (b) Constant function (c) Circular function
(d) Modulus function

(ii) The function $f: \Re \to \Re$ be defined by $f(x) = -x$ is:
(a) An even function (b) An odd function (c) Neither even nor odd
(d) None of these

(iii) $\lim_{n\to\infty}\left(1+\frac{1}{n}\right)^n =$ _____
(a) e (b) 0 (c) ∞ (d) 1

(iv) $\lim_{x\to 0}\frac{3^x-1}{x} =$ _____
(a) e (b) ln3 (c) log 3 (d) ∞

(v) The point of concurrence of the internal bisectors of the angles of a traingle is called its:
(a) Centriod (b) Circum centre (c) In centre (d) Ortho centre

(i) The inclination of al ine parallel to x - axis is:
(a) 0 (b) 90 (c) 45 (d) 30

(ii) The distance between (-2 -1) and (9, 4) is :
(a) $\frac{1}{13}$ (b) 11 (c) 13 (d) 15

(iii) The angle between the lines represented by $3x^2 + 7xt + 2y^2 = 0$ is:
(a) $\pi/3$ (b) $\pi/6$ (c) $\pi/9$ (d) $\pi/4$

(x) If $y = a^x$, then $\frac{dy}{dx} =$ _____
(a) $\frac{1}{x}$ (b) $a^x \ln a$ (c) $\frac{1}{a \ln x}$ (d) $\frac{1}{x \ln a}$

(x) $\frac{d}{dx}\sin^{-1}\frac{a}{x} =$ _____
(a) $\frac{-1}{x\sqrt{x^2-a^2}}$ (b) $\frac{-a}{x\sqrt{x^2-a^2}}$ (c) $\frac{a}{x\sqrt{x^2-a^2}}$ (d) $\frac{x}{\sqrt{x^2-a^2}}$

(xi) $\int \frac{du}{u^2} =$ _____
(a) $u + c$ (b) $-\frac{1}{u}$ (c) $-\frac{1}{u} + c$ (d) 0

(xii) $\int \frac{(\ln x)^3}{x} dx =$ _____
(a) $\frac{(\ln x)^4}{4} + c$ (b) $\ln x + c$ (c) $(\ln x)^3 + c$ (d) $\frac{1}{x^3} + c$

(xiii) The centre of the circle $(x + 2)^2 + y^2 = 25$ is:
a) (0, 0) (b) (0, -2) (c) (-2, 0) (d) (-2, 5)

(xiv) Length of the semi latus return of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is:
(a) $2b/2$ (b) b/a (c) $2b^2/a$ (d) b^2/a^2

(xv) The ecentricity ofa rectangular Hyperbola is:
(a) 1 (b) 2 (c) $\frac{2}{\sqrt{2}}$ (d) $\frac{1}{2}$

(xvi) The radius of the circle $x^2 + y^2 + 2fy + c = 0$ is:

(a) $\sqrt{g^2 + f^2 - c}$ (b) $\frac{1}{2}\sqrt{g^2 + f^2 - c}$ (c) $\frac{1}{2}\sqrt{g^2 + f^2 + c}$ (d) $\sqrt{g^2 + f^2 + c}$

(xvii) The unit vector of a vector (3m -2, 7) is:

(a) $\frac{2i + 3j + 7k}{\sqrt{62}}$ (b) $\frac{3i + 2j + 7k}{\sqrt{54}}$ (c) $\frac{3i + 2j + 7k}{\sqrt{64}}$ (d) $\frac{3i + 2j + 7k}{\sqrt{62}}$

(xviii) If a = 3i _ xj + 2k and b = 4i + 3K are perpendicular then x = _____

(a) 18/7 (b) 2/3 (c) 3 (d) 6

(xix) The focal radius of the point (a, b) on the parabola $x = 4xy$ equal to:

(a) |a - b| (b) |a + b| (c) |b -c| (d) $\frac{1}{2}|a + b|$

(Xx) $\int_0^{x/3} \text{Sin}2x\,dx =$ _____

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

Section-B

Note: Solve any TEN of the following questions. Each question carries 5 marks

Q.2 A function f: $\mathbb{R} \to \mathbb{R}$, defined by $f(x) = \begin{cases} 0 \text{ when } x \in Q \\ 1 \text{ when } x \in R - Q \end{cases}$ then prove that the function is neither one-one nor onto, Also find the range of f.

Q.3 The points, and are the mid points of the sides of a triangle ,Find its vertices.

Q.4 Evaluate $\lim_{x \to 0}\left(\frac{1-2x}{1-3x}\right)^{\frac{1}{x}}$

Q.5 Prove that diagonals of an isosceles trapezoid are equal.

Q.6 Use differentitals , approximate tan 46°.

Q.7 Find the fourth vertex of the parallelogram formed by the points (1,-2) *1,0) and (2, 1).

Q.8 Show that an equilateral triangle has congruent angles.

Q.9 Find the tangents of the angles of the triangle whose vertices are A(4,1) B(-1,3) an C(-5,2).

Q.10 Evaluat $\lim_{x \to \infty} \frac{\sqrt{a^2 + 4}}{x + 2}$

Q.11 Solve the different equation $4 + 3y^2\frac{dy}{dx} = 1 + 2x^2$, when y(3) = 1.

Q.12 Find the equation of the circle touching both the axes and of radius 5 units in the firs and fourth quardrants.

Q.13 If $\int_0^{\frac{\pi}{2}} k.\cos x\,dx = 4$, find k?

Q.14 For what value of p, do the vectors $3i + 2j + k$, and $-2i + j$ are coplanar.

Section-C

Note: Solve any THREE of the following questions.

Q.15 (a) If $y = (\sin^{-1}x)^2$ prove that $(1 - x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} - 2 = 0$

(b) Find the volume of the parallelopiped determined by $\vec{u} = i + 2j + k$, $\vec{v} = i - 2j + 3k$, $\vec{w} = i + 7j - 4k$.

Q.16 Find the derivative of $\tan 2\sqrt{x}$ by definition. (b) Find $\int \frac{e^x(1+x)}{(2+x)^2}\,dx$.

Q.17 (a)A line whose y- intercpet is 1 less than its x-intercept forms with the coordinate axes a triangle of area 6 squae units. What is its equation?

(b) Use differentials to find approximate value of cot 59°.

Q.18 (a) Prove that the two cirlce $x^2 + y^2 + 2gx + c = 0$ and $x^2 + y^2 + 2fy + c = 0$ touch each other if , $\frac{1}{f^2} + \frac{1}{g^2} = \frac{1}{c}$

(b) Find the directirces and length of latusrectum of the ellipse , $\frac{x^2}{9} + \frac{y^2}{4} = 1$