P-395 MRD-XII-19 (A)

Total Time: 3:00 Hours

Mathematics (Part-II)

(Fresh/New Course)

Total Marks: 100

Note: There are three sections in this paper i.e. Section A, B & C.

VERSION : C

Time Allowed: 20 Minutes

"Section-A"

Marks: 20

INSTRUCTIONS:

- Attempt this section on the MCQs Answer Sheet only.
- Use black ball point or marker for shading only one circle for correct option of a question.
- No mark will be awarded for cutting, erasing, over writing and multiple circles shading.

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

1. $\frac{d}{dx}(\sin^{-1}x) =$ .....
   Ⓐ $\frac{-1}{\sqrt{1-x^2}}$ ● $\frac{1}{\sqrt{1-x^2}}$ Ⓒ $\frac{-1}{x\sqrt{x^2-1}}$ Ⓓ $\frac{1}{x\sqrt{x^2-1}}$
2. $\frac{d}{dx}\left(\sin\frac{a}{x}\right) =$ .....
   Ⓐ $\cos\frac{a}{x}$ Ⓑ $-\sin\frac{a}{x}$ Ⓒ $\frac{1}{a}\cos\frac{a}{x}$ ● $\frac{-a}{x^2}\cos\frac{a}{x}$
3. $\int \frac{dx}{\cos^2 x} =$ .....
   Ⓐ $\sec^2 x + C$ Ⓑ $\text{cosec}^2 x + C$ ● $\text{Tan}\, x + C$ Ⓓ $\cot x + C$
4. $\int_{12}^{20} dx =$ .....
   Ⓐ 4 Ⓑ 6 ● 8 Ⓓ 10
5. $\int_{2}^{2} (x^2 + x + 1)dx =$ .....
   Ⓐ 18 Ⓑ 16 Ⓒ 14 ● 0
6. The slope on the points (2, 4) and (4, 6) is equal to .....
   Ⓐ -1 ● 1 Ⓒ -2 Ⓓ 2
7. In $x^2 + y^2 + 6x + 8y = 0$, the centre $(-g, -f)$ is equal to .....
   ● $(3, 4)$ Ⓑ $(-3, -4)$ Ⓒ $(-3, 4)$ Ⓓ $(3, -4)$
8. Two lines $a1x + b1y + c1 = 0$ and $a2x + b2y + c2 = 0$ are perpendicular if .....
   Ⓐ $a1b1 + a2b2 = 0$ Ⓑ $a1a2 + b1b2 = 0$ Ⓒ $a1b1 - a2b2 = 0$ Ⓓ $a1a2 - b1b2 = 0$
9. The circle shrinks into a point$(-g, -f)$ if .....
   Ⓐ $g^2 + f^2 - c > 0$ ● $g^2 + f^2 - c = 0$ Ⓒ $g^2 + f^2 - c < 0$ Ⓓ $g^2 - f^2 - c > 0$
10. The conic having ecentricity $e > 1$ is called .....
    Ⓐ Parabola Ⓑ Ellipse ● Hyperbola Ⓓ Circle
11. The line $y = mx + c$ should touch the circle $x^2 + y^2 = a^2$ if c = ...
    Ⓐ $\pm\sqrt{1+m^2}$ Ⓑ $\pm\sqrt{1-m^2}$ ● $\pm a\sqrt{1+m^2}$ Ⓓ $\pm a\sqrt{1-m^2}$
12. In $\frac{x^2}{16} - \frac{y^2}{9} = 1$, the asymptotes are .....
    ● $y = \pm\frac{3}{4}x$ Ⓑ $x = \pm\frac{3}{4}y$ Ⓒ $y = \pm\frac{4}{3}x$ Ⓓ $x = \pm\frac{4}{3}y$
13. The order of the differential equation $\left(\frac{d^2y}{dx^2}\right)^3 + \left(\frac{dy}{dx}\right) + 2x = 4$ .....
    Ⓐ 1 ● 2 Ⓒ 3 Ⓓ 4
14. For parabola $x^2 = 4py$, if $p < 0$, then it is open .....
    ● Up Ⓑ Down Ⓒ Left Ⓓ Right
15. The function $f(x, y) = x^4 - 2x^3y + xy^3$ is a homogenous function of degree .....
    Ⓐ 1 Ⓑ 2 Ⓒ 3 ● 4
16. If $f(x, y) = \frac{x}{y}$ then $f_y =$ .....
    Ⓐ $\frac{1}{y}$ Ⓑ $\frac{x}{y^2}$, Ⓒ $-\frac{1}{y}$ ● $-\frac{x}{y^2}$
17. $\frac{e^x}{e^{3-x}} =$ .....
    Ⓐ e^{x-3} Ⓑ e^{x+3} ● e^{2x-3} Ⓓ e^{2x+3}
18. The function that takes x as dependent variable in response of y as the independent variable is called ..... function.
    Ⓐ Composite ● Inverse Ⓒ Algebraic Ⓓ Exponential
19. $\lim_{x\to -2}(x^2 + 3x - 7) =$ .....
    Ⓐ 0 ● -9 Ⓒ -17 Ⓓ 9
20. $\frac{d}{dx}(2e^2) =$ .....
    ● 0 Ⓑ $2e^2$ Ⓒ $4e$ Ⓓ $4e^2$

P-396 MRD-XII-19 (A)

Total Time: 2:40 Hours

Mathematics (Part-II)

(Fresh/New Course)

Total Marks: 80

"Section-B"

Marks: 50

Q. 2. Attempt any Ten (10) of the following parts. Each part carries equal marks.

(i) Find the inverse function $f(x) = 2x + 7$

(ii) Evaluate: $\lim_{x \to 5} \frac{\sqrt{x} - \sqrt{5}}{x - 5}$

(iii) Find $\frac{dy}{dx}$, if $y = \frac{1+\text{Tan } 2x}{\text{Cosec } 3x}$

(iv) Find $\frac{dy}{dx}$, if $y = \cos x^{\log x}$

(v) If $f(\theta) = \sin^2\theta\, i + \cos 2\theta\, j + \theta^2\, k$, Find $F'(\theta)$ and $F''(\theta)$

(vi) Evaluate $\int \frac{\sin x}{\cos^2 x + 1}\, dx$ by substitution.

(vii) Use integration by parts to evaluate $\int x^2 \ln x\, dx$

(viii) Evaluate: $\int_0^1 \frac{x - 1}{x^2 - 2x + 3}\, dx$

(ix) Find the angles of the triangle ABC; whose vertices are A(1, 2), B(4, 2) and C(−2, 3).

(x) Find an equation of a circle which passes through the point (−3, 0) and is concentric to circle $x^2 + y^2 - 3x - 4y - 10 = 0$

(xi) For what value of C, the line $y = mx + c$ touches the circle $x^2 + y^2 = a^2$

(xii) Find the equation of parabola with focus at F(0, 3) and directrix $y = -3$

(xiii) Find the equation of hyperbola with vertices at (2, −2), (−4, −2) and that passes through the point of coordinates (5, 1).

"Section-C"

Marks: 30

Note:- Attempt any Three (3) questions. Each question carries equal marks.

Q. 3. (a) $\lim_{x \to 0} \left[\frac{\sin x}{x}\, i + \frac{1 - \cos x}{x}\, j + e^{1-x}\, k\right]$

(b) Determine the slope of the tangent line to the curve $3x^2 - 7y^2 + 14y = 27$ at the point (−3,0)

Q. 4. (a) Evaluate: $\int \frac{x^2 - 1}{x^2 - 2x - 15}\, dx$

(b) In Δ ABC the vertices are A(0, 0), B(8, 6) and C(12, 0). Show that the right bisectors of the triangle ABC are concurrent.

Q. 5. (a) Find an equation of a circle which passes through the points (1, 2), (3, −4), (5, −6)

(b) Find the equation of ellipse with vertices are at (−5, 0) and (5, 0) and the ecentricity is $e = \frac{3}{5}$

Q. 6. (a) Evaluate initial value problem: $\frac{dy}{dx} = x^2$, $y(0) = 1$

(b) If $z = xyf\left(\frac{x}{y}\right)$, then show that $x \frac{\partial z}{\partial x} + y \frac{\partial z}{\partial y} = 2z$.