Mathematics
Time: 30 Minutes

(INTER PART II)-418-(II)
Code: 8193
OBJECTIVE

PAPER: II
Marks: 20

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two more circles will result in zero mark in that question. Attempt as many questions as given in objective type question paper and leave others blank.

1- 1- If $\vec{u} = \vec{v}$, then $\vec{u}.(\vec{v} \times \vec{w}) =$

(A) 0 (B) 1 (C) –1 (D) cannot be calculated

2- If $a = b$ then equation $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ represents

(A) ellipse (B) parabola (C) hyperbola (D) circle

3- Length of Latus Rectum of Parabola $x^2 = 5y$ is

(A) 5 (B) 20 (C) $\frac{5}{4}$ (D) 10

4- If P(7, –2) lies on circle with centre (–5, 3), then its radius is

(A) 13 (B) $\sqrt{13}$ (C) 17 (D) $\sqrt{17}$

5- If m_1, m_2 are slopes of perpendicular lines, then $m_1 m_2 =$

(A) 0 (B) –1 (C) 1 (D) undefined

6- $\int_0^1 \frac{1}{1+x^2}\,dx =$

(A) 1 (B) $\frac{\pi}{4}$ (C) 0 (D) $\frac{\pi}{2}$

7- $\int e^{ax}\left(af(x) + f'(x)\right)dx =$

(A) $e^{ax}.af(x)$ (B) $e^{ax}.f'(x)$ (C) $e^{ax}.f(x)$ (D) $e^{ax}.af'(x)$

8- $\frac{d}{dx}e^{f(x)} =$

(A) $e^{f(x)}$ (B) $f(x)e^{f(x)}$ (C) $e^{f(x)}f'(x)$ (D) $f(x)e^{f(x)-1}$

9- $\frac{d}{dx}\cos x^2 =$

(A) $\sin x^2$ (B) $-\sin x^2$ (C) $-2x\sin x^2$ (D) $-2x\sin x$

10- $\frac{e^x - e^{-x}}{2} =$

(A) $\sin x$ (B) $\cos x$ (C) $\sinh x$ (D) $\cosh x$

(Turn over)

Mathematics (INTER PART II)-418 **PAPER: II**

Time: 2:30 hours **Marks: 80**

SUBJECTIVE

Note: Section I is compulsory. Attempt any three (3) questions from Section II.

SECTION I

2. Write short answers to any EIGHT questions: **(2 x 8 = 16)**

i- Define implicit function also write one example.

ii- For $f(x) = \frac{x^3 - x}{x^2 + 1}$, determine whether given function is even or odd

iii- Prove that: $\lim_{n \to +\infty} \left(1 + \frac{1}{n}\right)^n = e$

iv- Find by definition the derivative of $x(x-3)$ with respect to 'x'.

v- Find the derivative of $(x^2 + 5)(x^3 + 7)$ w.r.t. 'x'

vi- If $y = x^4 + 2x^2 + 2$ prove that $\frac{dy}{dx} = 4x\sqrt{y-1}$

vii- Differentiate $x^2 + \frac{1}{x^2}$ w.r.t., $x - \frac{1}{x}$

viii- Calculate $\frac{d}{dx}(\cos\sqrt{x} + \sqrt{\sin x})$

ix- If $f(x) = \ell n\,(e^x + e^{-x})$. Find $f'(x)$

x- Find $\frac{dy}{dx}$ if $y = (\ell n \tanh x)$

xi- Find y_2 if $x = a\cos\theta$, $y = a\sin\theta$.

xii- Divide 20 into two parts so that the sum of their squares will be maximum.

3. Write short answers to any EIGHT questions: **(2 x 8 = 16)**

i- Using differentials find $\frac{dy}{dx}$ and $\frac{dx}{dy}$. $x^4 + y^2 = xy^2$

ii- Evaluate: $\int \frac{1}{1 + \cos x}\,dx$.

iii- Evaluate: $\int \frac{e^x}{e^x + 3}\,dx$.

iv- Evaluate: $\int \tan^{-1}x\,dx$.

v- Evaluate: $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \cos t\,dt$

vi- Evaluate: $\int_0^3 \frac{dx}{x^2 + 9}$

vii- Find the area between the x-axis and the curve $y = \cos\frac{1}{2}x$ from $x = -\pi$ to π.

viii- Define differential equation.

ix- Solve the differential equation $\frac{dy}{dx} = \frac{y}{x^2}$

x- Solve $\left(e^x + e^{-x}\right)\frac{dy}{dx} = e^x - e^{-x}$

xi- Define corner point.

xii- Graph $3x - 2y \geq 6$ in xy – plane.

(Turn over)