

MATHEMATICS

PAPER : PART - II

MARKS: 80

TIME : 2:30 Hours

019/01
INTERMEDIATE

ATK-12-19

(SUBJECTIVE PART)

Note:- Attempt any TWENTY FIVE (25) short questions in all selecting eight from Q. 2 and Q. 3 each and nine from Q. 4. (25 x 2 = 50)

SECTION - I

2- Write short answers of any eight questions.

(2 x 8 = 16)

1	Define even function.	2	Prove the identity $\text{Sech}^2 x = 1 - \tanh^2 x$
3	Evaluate $\lim_{x \rightarrow \pi} \left(\frac{\sin x}{\pi - x} \right)$	4	If $y = \sqrt{x} - \frac{1}{\sqrt{x}}$, show that $2x \frac{dy}{dx} + y = 2\sqrt{x}$
5	Find $\frac{dy}{dx}$ if $xy + y^2 = 2$	6	Prove that $\frac{d}{dx}(\tanh x) = \text{Sech}^2 x$
7	Find $\frac{dy}{dx}$ if $y = \text{Sinh}^{-1} \frac{x}{2}$	8	Find $f'(x)$ if $f(x) = e^x(1 + \ln x)$
9	Find $\frac{dy}{dx}$ if $y = \ln \sqrt{\frac{x^2 - 1}{x^2 + 1}}$	10	Find y_2 if $y = (2x + 5)^{3/2}$
11	Determine $f(x) = 4 - x^2$ is increasing or decreasing in the interval (0,2)	12	Define Critical value of a function.

3- Write short answers of any eight questions.

(2 x 8 = 16)

1	Use differential to approximate the value of $(31)^{1/5}$	2	Evaluate $\int \frac{ax + b}{ax^2 + 2bx + c} dx$
3	Integrate by substitution $\int a^x x dx$, ($a > 0, a \neq 1$)	4	Find the integral $\int \frac{dx}{\frac{1}{2} \sin x + \frac{\sqrt{3}}{2} \cos x}$
5	Evaluate integral by parts $\int x^2 \ln x dx$	6	Find indefinite integral $\int e^{-x}(\cos x - \sin x) dx$
7	Evaluate $\int \frac{3x + 1}{x^2 - x + 6} dx$	8	What is definite integral?
9	Calculate the integral $\int_{-6}^2 \sqrt{3-x} dx$	10	Define order of a differential equation.
11	What is convex region?	12	Graph the inequality $2x + 1 \geq 0$

4- Write short answers of any nine questions.

(2 x 9 = 18)

1	Prove that the points A(3,1), B(-2,-3) and C(2,2) are vertices of an isosceles triangle.	2	The two points P and O' are given in xy plane. Find the XY coordinates of P referred to the translated axes O'X and O'Y if P(-2,6), O'(-3,2)
3	Convert the line $4x + 7y - 2 = 0$ into two intercepts form.	4	Define transverse axis of hyperbola.
5	Find equation of ellipse with vertices (0,±5), eccentricity $\frac{3}{5}$	6	Define axis of parabola.
7	Find radius of circle $x^2 + y^2 - 6x + 4y + 13 = 0$	8	The vertices of a triangle are A(-2,3), B(-4,1), C(3,5). Find coordinates of centroid.
9	If O is origin and $\vec{OP} = \vec{AB}$ Find point P when A and B are (-3,7), (1,0)	10	Write direction cosine of $\underline{v} = 2\underline{i} + 3\underline{j} + 4\underline{k}$
11	Find projection of \underline{b} along \underline{a} if $\underline{a} = 3\underline{i} + \underline{j} - \underline{k}$, $\underline{b} = 2\underline{i} + \underline{j} + \underline{k}$,	12	Which vectors if any are parallel $\underline{u} = 5\underline{i} - \underline{j} + \underline{k}$, $\underline{v} = \underline{j} - 5\underline{k}$, $\underline{w} = -15\underline{i} + 3\underline{j} - 3\underline{k}$
13	Find the work done if the point at which the constant force $\underline{F} = 4\underline{i} + 3\underline{j} + 5\underline{k}$ is applied to an object moves from P ₁ (3,1,-2) to P ₂ (2,4,6)		

P.T.O

AJK-12-19

(2)

SECTION - II

Note:- Attempt any three questions from this section.
All questions carry equal Marks.

(10x3=30)

5	(a)	If $f(x) = \begin{cases} \frac{\sqrt{2x+5} - \sqrt{x+7}}{x-2}, & x \neq 2 \\ k, & x = 2 \end{cases}$	(05)
		Find the value of "k" so that f(x) is continuous at x=2	
	(b)	Show that $y = \frac{\ln x}{x}$ has a maximum value at x=e	(05)
6	(a)	Evaluate $\int \frac{dx}{\sqrt{7-6x-x^2}}$	(05)
	(b)	Find the equation of the line through (5,-8) and perpendicular to the join of A(-15,-8), B(10,7).	(05)
7	(a)	Evaluate $\int_0^{\frac{\pi}{4}} \cos^4 t \, dt$	(05)
	(b)	Minimize $Z = 3x + y$; subject to the constraints; $3x + 5y \geq 15$; $x + 6y \geq 9$, $x \geq 0$, $y \geq 0$	(05)
8	(a)	Find a joint equation of the straight lines through the origin perpendicular to the lines represented by $x^2 + xy - 6y^2 = 0$	(05)
	(b)	Write down equations of the tangent to the circle, $4x^2 + 4y^2 - 16x + 24y - 117 = 0$ at points whose abscissa is -4	(05)
9	(a)	Find equation of hyperbola with elements Foci (0,±6), e=2	(05)
	(b)	By using vectors, prove that $a^2 = b^2 + c^2 - 2bc \cos A$ for $\triangle ABC$	(05)

(The End)