

DAE/IIA-2016/02 SECOND YEAR

(Common with Architecture, Automation, Auto-Mobile & Diesel, Auto & Farm Machinery, Civil, Cast Metal & Foundry, Foundry & Pattern Making, Land & Mine Surveying, Mechanical, Mining, Mechatronics, Metallurgy & Welding, Q. Surveying, Construction Machinery and Footwear Technologies.)

MATH-212 APPLIED MATHEMATICS - II

PART - B

Time: 2:30 hours

Marks:80

SECTION - I

Q.1: Write short answer to any Twenty-Five (25) of the following questions: -

25 × 2 = 50

1.	If $f(x) = \frac{x^2 - 3}{x + 4}$, find $f(-3)$.	2.	Is the following function even, odd or neither? $f(x) = x\sqrt{x^2 - 1}$
3.	Evaluate: $\lim_{x \rightarrow -2} \frac{x^2}{x + 1}$	4.	Evaluate: $\lim_{\theta \rightarrow 0} \frac{\sin 7\theta}{\theta}$
5.	Differentiate $-5 + 3x - \frac{3}{2}x^2 - 7x^3$ w.r.t. 'x'.	6.	Differentiate $(x^2 + 3x + 9)^{3/2}$ w.r.t. 'x'.
7.	Differentiate $\sin^n x$ w.r.t. 'x'.	8.	Find $\frac{dy}{dx}$ if $xy + y^2 = 2$
9.	Find $\frac{dy}{dx}$, $x = t + 2$, $y = 2t^2 + 2$	10.	Differentiate $y = \sin^{-1} \sqrt{x}$ w.r.t. 'x'.
11.	Differentiate $\frac{x}{\ln x}$ w.r.t. 'x'.	12.	Find $\frac{dy}{dx}$ for $e^{\sqrt{x+1}}$
13.	Differentiate $\cos x$ w.r.t. $\sin x$.	14.	Find the derivative of $x \cot x$ w.r.t. 'x'.
15.	Differentiate $\frac{x}{x^2 + 1}$ w.r.t. 'x'.	16.	Find the critical values (turning points) for x of the function $5x^2 - 4x + 9$
17.	Evaluate $\int (3x^2 + 2x + 1) dx$	18.	Evaluate $\int (e^x + e^{-x})^2 dx$
19.	Evaluate $\int (\sin x - \cos x)^2 dx$	20.	Evaluate $\int (2x + 9)^{-5/2} dx$
21.	Evaluate $\int \cos^4 x \sin x dx$	22.	Evaluate $\int \frac{x}{x^2 + 1} dx$
23.	Evaluate $\int \frac{1}{\sqrt{x}} \sin \sqrt{x} dx$	24.	Evaluate $\int \ln x dx$
25.	Evaluate $\int_1^3 x^2 dx$	26.	Evaluate $\int_0^{\pi/6} 2 \sin 2x dx$
27.	Evaluate $\int \frac{1+x}{x} dx$	28.	Find the distance between $(-3, -2)$ and $(-1, 5)$
29.	Find mid-point of the following points: $A(0, -1)$, $B(-1, 2)$	30.	Find the slope of a line which is perpendicular to the line joining $P_1(2, 4)$ and $P_2(-2, 1)$.
31.	Find the equation of the line with the intercepts are $a = 2$, $b = -5$.	32.	Show that the two lines passing through the given points are perpendicular: $(8, 0)$, $(6, 6)$ and $(-3, 3)$, $(6, 6)$
33.	Reduce the given equations to Slope-intercept form: $6x - 5y = 15$	34.	Show that the three points $(1, 2)$, $(7, 6)$, $(4, 4)$ are collinear.
35.	Find the equation of circle with center at $(-2, 3)$ and radius 6.	36.	Find the center and radius of the circle $x^2 + y^2 - 6x + 6y = 0$
37.	What type of circle is represented by $x^2 + y^2 - 2x + 4y + 8 = 0$		

SECTION - IINote: *ATTEMPT ANY THREE QUESTIONS.*

3 × 10 = 30

Q.2: (a) If $f(t) = \frac{t^4 + t^2 + 1}{t^2}$, show that $f\left(\frac{1}{t}\right) = f(t)$.

(b) Differentiate $\sqrt{\frac{a+x}{a-x}}$ w.r.t. 'x'.

Q.3: (a) Differentiate $\ln \frac{x}{\sqrt{1+x^2}}$ w.r.t. 'x'.

(b) Find the maximum and minimum values of the function $2x^3 - 3x^2 - 36x + 3$

Q.4: (a) Evaluate $\int \left(x + \frac{1}{x}\right) \left(x^2 + \frac{1}{x^2}\right) dx$

(b) Evaluate $\int (\tan^4 x + \tan^2 x) dx$

Q.5: (a) Evaluate $\int (\ln x)^2 dx$

(b) Show that the points A(2, 2), B(6, 6) and C(11, 1) are the vertices of a right triangle.

Q.6: (a) If a line l_1 contains P(2, 6) and Q(0, y). find y if l_1 is parallel to l_2 and the slope of $l_2 = \frac{3}{4}$.

(b) Find the equation of the circle concentric with the circle $x^2 + y^2 - 6x + 4y - 12 = 0$ with radius 6 units.