

DAE/IA - 2018/02 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 answers to any Twenty Five (25) of the following questions:-

25 x 2 = 50

1.	If $f(x) = 3x^2 - 7x + 4$, then find $f\left(\frac{1}{x}\right)$	2.	Find $\lim_{x \rightarrow 3} \frac{x-3}{x^2-9}$
3.	Show that the function $f(x) = x^4 - 7x^2 + 7$ is an even function of x .	4.	Find the value of $\lim_{x \rightarrow 0} \left(1 + \frac{x}{3}\right)^{\frac{1}{x}}$
5.	If $y = u^n$ and $u = 3x^3 - 7x^2 + x + 1$, find $\frac{dy}{dx}$	6.	Find $\frac{dy}{dx}$ if $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$
7.	Find $\frac{d}{dx} \left(\frac{1}{(ax+b)^m}\right)$	8.	If $y = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \dots$, then show that $\frac{dy}{dx} = y$
9.	Find the derivative of $x \cot x$ w.r.t x	10.	Find the derivative of $\sin^{-1}\left(\frac{x}{a}\right)$
11.	If $x = a \sec \theta$, $y = b \tan \theta$, then find $\frac{dy}{dx}$	12.	Find the value of $\frac{d}{dx} (x^x)$
13.	If $y = \ln x$, find y_2	14.	Find the derivative of $x^2 \sec 4x$
15.	If displacement is $S = \sin 2t$, Find its acceleration.	16.	Find the turning point of the curve $y = x^2 - 3x + 3$
17.	Find $\int (2x + 9)^{-\frac{5}{2}} dx$	18.	Evaluate $\int \frac{x}{a+x} dx$
19.	Find $\int \cos^2 x dx$	20.	Evaluate $\int \frac{dx}{(1+x^2)\tan^{-1}x}$
21.	Find $\int x^2 \cdot e^{x^3} dx$	22.	Find the value of $\int \tan^{-1} x dx$
23.	Find $\int \ln x dx$	24.	Evaluate $\int \frac{\cot x}{\ln \sin x} dx$
25.	Calculate the integral $\int_1^8 \frac{dx}{\sqrt[3]{x}}$	26.	Find $\int_0^{\frac{\pi}{4}} \frac{dx}{\cos^2 x}$
27.	Evaluate $\int_0^3 \sqrt[3]{(3x-1)^2} dx$	28.	Evaluate $\int \frac{1}{\sqrt{x}} \sin \sqrt{x} dx$
29.	Find the equation of a line through the point $(3, -2)$ with slope $m = \frac{3}{4}$	30.	Find the point of intersection of the lines $x + 2y - 3 = 0$ and $2x - 3y + 8 = 0$
31.	Find the distance from the point $(-2, 1)$ to the line $3x + 4y - 12 = 0$	32.	Find the angle between the lines having slopes '-3' and '2'
33.	Find the mid point of segment $P_1(3, 7)$ and $P_2(-2, 3)$	34.	Define imaginary circle.
35.	Find the equation of circle with center on origin and radius $\frac{1}{2}$	36.	Find the centre and radius of the circle $6x^2 + 6y^2 - 18y = 0$
37.	Write the general form of the equation of the circle, also represent the centre and radius of this form.		

SECTION - II

NOTE: ATTEMPT ANY THREE QUESTIONS.

3 x 10 = 30

Q.2 a) If $f(x) = \frac{x-1}{x+1}$, show that $\frac{f(x)-f(y)}{1+f(x)f(y)} = \frac{x-y}{1+xy}$

b) If $y = x^4 + 2x^2$, prove that $\frac{dy}{dx} = 4x\sqrt{y+1}$

Q.3 a) If $x = a(\cos t + \sin t)$, $y = a(\sin t - t \cos t)$, find $\frac{dy}{dx}$

b) Show that $\frac{e^{nx}}{x}$ has a maximum value at $x = e$

Q.4 a) Evaluate $\int \frac{1}{\sqrt{x+a} + \sqrt{x+b}} dx$

b) Evaluate $\int \frac{dx}{\sqrt{a^2-x^2}}$

Q.5 a) Evaluate $\int e^x \sin x dx$

b) Find the value of y so that the distance between $(1,y)$ and $(-1,4)$ is 2.

Q.6 a) Show that the points $(2,6)$, $(-8,1)$ and $(-2,4)$ are collinear by using slope.

b) Find the equation of the circle which is tangent to the positive x -axis and y -axis and radius 5 units.

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