(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 $f(x) = 3x^2 - 5x + 7$, find $f(4)$	2.	Is the following function even, odd or neither? $f(x) = 4x^3 - 2x + 6$
3.	Evaluate $\lim_{x \to 1} \frac{x^2-1}{x-1}$	4.	Evaluate $\lim_{x \to 0} \frac{1-Cos2x}{x^2}$
5.	Differentiate $\frac{1}{5} x^{\frac{5}{2}} + \frac{1}{3} x^{\frac{3}{2}}$ w.r.t 'x'	6.	Differentiate $\sqrt{x^2+1}$ w.r.t 'x'
7.	Differentiate $Sin(\tan x)$ w.r.t 'x'	8.	Find $\frac{dy}{dx}$ if $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$
9.	Differentiate $2x^2 + x + 1$ w.r.t x^2-x-1	10.	Differentiate $\tan^{-1}\sqrt{x}$ w.r.t 'x'
11.	Differentiate $x \ell nx - x$ w.r.t 'x'	12.	Differentiate $e^{Sin\,2x}$ w.r.t 'x'
13.	Differentiate $Sin\, x$ w.r.t $\tan x$.	14.	If $x = Sin\, 2t$, $y = 2Cos\, t$ then find $\frac{dy}{dx}$
15.	Find derivative of $x\sqrt{x+1}$ w.r.t 'x'	16.	Find the critical values (turning points) for x of the function $x^2 - 4x - 1$
17.	Evaluate $\int \left(\sqrt{x} + \frac{1}{\sqrt{x}}\right) dx$	18.	Evaluate $\int \frac{1}{2}\left(e^{\frac{1}{2}x} - e^{-\frac{1}{2}x}\right) dx$
19.	Evaluate $\int Cot^2x \, dx$	20.	Evaluate $\int \frac{x^2+1}{x+1} dx$
21.	Evaluate $\int \sqrt{Sin\, x} \, cosx \, dx$	22.	Evaluate $\int \frac{dx}{(1+x^2)\tan^{-1}x}$
23.	Evaluate $\int \frac{\ell nx}{x} dx$	24.	Evaluate $\int x \, Cos\, 3x \, dx$
25.	Evaluate $\int_1^8 \frac{dx}{\sqrt[3]{x}}$	26.	Evaluate $\int_0^{\frac{\pi}{6}} Sec^2x \, dx$
27.	Evaluate $\int \frac{x^3+1}{x^5} dx$	28.	Find the distance between $(-4,2)$ and $(0,5)$
29.	Show that the points $(2,6)$, $(-8,1)$ and $(-2\,4)$ are collinear.	30.	Find the equation of a line through the point $(3, -2)$ with slope $m = \frac{3}{4}$
31.	Reduce the equation $3x + 4y - 2 = 0$ into intercept form.	32.	Find the slope of a line which is perpendicular to the line joining $P_1(2,4), P_2(-2,1)$
33.	Is the point $(0,4)$ inside or outside the circle of radius 4 with center at $(-3\,1)$.	34.	For the triangle $A(1,3)$, $B(-2,1)$, $C(0,-4)$ find slope of a line parallel to AC.
35.	Find the equation of the circle with the given center and radius $(-1,2)$, $r = \sqrt{2}$	36.	Find the center and radius of the circle $X^2 + y^2 - 4x + 6y - 12 = 0$
37.	Write the general form of the circle, also represent the center and radius in this form.		

SECTION - II

NOTE: ATTEMPT ANY THREE QUESTIONS. $3 \times 10 = 30$

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)   Differentiate $\left(\frac{x+1}{x-1}\right)^2$ w.r.t 'x'   (5,5)

Q.3   a)   Find the derivative of $\frac{Sin\,x}{1-\cos x}$ w.r.t 'x'

       b)   Find the maximum and minimum (extreme) values of the function $(x-2)^2(x-1)$ (5,5)

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

       b)   Evaluate $\int Sin^3 x\, dx$ (5,5)

Q.5   a)   Integrate $\int x^2 tan^{-1}x\, dx$

       b)   Find the point which is two third of the way from the point (5,1)
             to the point (-2,9).   (5,5)

Q.6   a)   Show that the given points are the vertices of a parallelogram
             (-3,1),(-1,7), (2,8) and (0,2)

       b)   Find the equation of circle having (-2,5) and (3,4) as the end points of its
             diameter. Find also its center and radius.   (5,5)

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