DAE/IIA – 2017/02 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 $f(x) = \frac{1}{1-x}$, then find $f\{f(5)\}$.	2.	Find $\lim_{x\to 0} \frac{\sqrt{1+x}-1}{x}$
3.	Evaluate $\lim_{x\to 0} \frac{\tan x}{x}$	4.	Determine the function $f(x) = 2x^3 - 9x$ is even, odd or neither.
5.	Find $\frac{dy}{dx}$ if $\sqrt{x} + \sqrt{y} = 5$	6.	If $y = (3x^2 + 2x + 9)^7$, find $\frac{dy}{dx}$
7.	Differentiate $\frac{x^2}{1+x^2}$ w.r.t x^2	8.	If $y = \sqrt{1 + x^2}$, show that $y\frac{dy}{dx} = x$
9.	Find the derivative of Cos(Cotx).	10.	Find $\frac{d}{dx}(e^{2x}\cos 2x)$
11.	Find the derivative of $\frac{\tan x}{x^2}$	12.	Differentiate $\tan^{-1}\sqrt{x}$ w.r.t 'x'
13.	If $y = x^4 - 3x^2 + 4x - 1$, find $\frac{d^2y}{dx^2}$	14.	Find the derivative of $Sin^2x\ Cos^3x$ w.r.t x
15.	If $S = Sin2t$, find the velocity at $t = \frac{\pi}{6}$	16.	Find the turning points of the function $x^3 - 3x^2 - 24x + 10$
17.	Find $\int \left(x + \frac{1}{x}\right)^2 dx$	18.	Find $\int \frac{x^2}{4+x^2} dx$
19.	Evaluate $\int (e^{3x} + e^{5x})dx$	20.	Evaluate $\int (\tan^4 x + \tan^2 x)dx$
21.	Find $\int x^4 Sec^2(x^5).dx$	22.	Find $\int \frac{Cos(\ell nx)}{x} dx$
23.	Find the value of $\int xe^x dx$	24.	Evaluate $\int \frac{Cos^{-1}x}{\sqrt{1-x^2}} dx$
25.	Evaluate $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} Sin\ 2x\ dx$	26.	Evaluate $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} Cos\ x\ dx$
27.	Calculate the integral $\int_1^3 \left(x - \frac{1}{x}\right) dx$	28.	Integrate $\int \frac{\tan(\ell nx)}{x} dx$
29.	Find equation of a line through points (-1,2) and (3,4).	30.	Find the distance between (-4,2) and (0,5).
31.	Find an equation of the line with slope $-\frac{2}{3}$ and having y – intercept 3.	32.	Show that the points (1,9) , (-2,3) and (-5, -3) are collinear.
33.	Find k so that the lines $x - 2y + 1 = 0$, $2x-5y + 3 = 0$ and $5x + 9y + k = 0$ are concurrent.	34.	What type of circle is represented by $x^2 + y^2 + 2x - 4y + 8 = 0$
35.	Write the equation of circle with center at (h,k) and radius r.	36.	Find the center and radius of the circle $x^2 + y^2 + 9x - 7y - 33 = 0$
37.	Write the general form of the equation of the circle, also represent the center and radius of this form.		

SECTION - II

NOTE: ATTEMPT ANY THREE QUESTIONS. ***3 x 10 = 30***

Q.2 *a)* *Evaluate* $\lim_{\theta \to 0} \frac{\tan\theta - Sin\theta}{Sin^3\theta}$

b) *Find* $\frac{dy}{dx}$ *when* $x = \frac{a(1-t^2)}{1+t^2}$ *and* $y = \frac{2bt}{1+t^2}$

Q.3 *a)* *If* $y = tan\left(2tan^{-1}\frac{x}{2}\right)$, *prove that* $\frac{dy}{dx} = \frac{4(1+y^2)}{4+x^2}$

b) *Find the maximum and minimum values of the function* $\frac{x^3}{3} - \frac{3x^2}{2} + 2x + 5$

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

b) *Evaluate* $\int (\tan x \cot x)^2 \, dx$

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

b) *Show that the points A(2,3) , B(0,-1) and C(-2,1) are the vertices of an isosceles triangle.*

Q.6 *a)* *Show that the two lines passing through the given points are perpendicular (0,-7), (8,-5) and (5,7) , (8, - 5).*

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

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