C.U.SHAH UNIVERSITY
Summer-2015

Subject Code: 2TE02AMT1   **Subject Name: Advanced Mathematics**
Course Name: DIPLOMA   Date: 18/5/2015
Semester:II   Marks:70
                                                       Time:02:30 TO 05:30

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Instructions:
1) Attempt all Questions of both sections in same answer book/Supplementary.
2) Use of Programmable calculator & any other electronic instrument prohibited.
3) Instructions written on main answer book are strictly to be obeyed.
4) Draw neat diagrams & figures (if necessary) at right places.
5) Assume suitable & perfect data if needed.

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Q – 1 Do as directed.   (14)
(1) The distance between the points (1, 2) and (2, 3) is _____.
(2) Midpoint of (2, – 7) and (8, 3) is _____.
(3) Slope of the line $2x – 3y + 4 = 0$ is _____.
(4) X–intercept of line $x – 3y + 2 = 0$ is _____.
(5) Centre of the circle $x^2 + y^2 = 9$ is _____.
(6) $\lim\limits_{x \to 0} \dfrac{x^2+1}{x+1} = ?$
(7) $\lim\limits_{x \to 0} \dfrac{\sin x}{x} = ?$
(8) Derivative of $\sin x$ = _____.
(9) $\dfrac{d(\tan x)}{dx}$ = _____.
(10) If $y = \log x$ then $\dfrac{dy}{dx}$ = _____.
(11) Differentiate $y = e^{2x}$ with respect to x.
(12) $\int 1\, dx$ = _____.
(13) $\int \dfrac{1}{x}\, dx$ = _____.
(14) $\int e^x\, dx$ = _____.

Attempt any four from Q-2 to Q-8.
Q – 2
(1) If area of triangle having vertices (3, k), (9, 3), (5, 2) is 7 sq. units, find value of k.   (5)
(2) Find angle between straight lines $\sqrt{3}x – y + 1 = 0$ and $x – \sqrt{3}y + 2 = 0$.   (5)
(3) If P(7, 5), A(2, 4), B(6, 10) then prove that PA = PB.   (4)

Q – 3
(1) Find centre and radius of circle $36x^2 + 36y^2 + 24x – 36y – 23 = 0$.   (5)
(2) Find equations of tangent and normal to the circle $x^2 + y^2 – 6x + 10y + 21 = 0$
     at point (1, –2).   (5)
(3) Find the equation of line passing through (– 1, 2) and (1, – 2).   (4)

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Q – 4

(1) Prove that $\lim\limits_{x \to 3} \dfrac{\sqrt{x+2} - \sqrt{5}}{\sqrt{x+4} - \sqrt{7}} = \dfrac{\sqrt{35}}{5}$. (5)

(2) Prove that $\lim\limits_{x \to \infty} \sqrt{x^2 + 2x} - \sqrt{x^2 - 3} = 1$. (5)

(3) If $f(x) = \dfrac{1}{1+x}$ then show that $f(x) + f\left(\dfrac{1}{x}\right) = 1$. (4)

Q – 5

(1) Using definition find derivative of e^x. (5)

(2) Find $\dfrac{dy}{dx}$ if $y = \dfrac{1 + \sin x}{1 - \sin x}$. (5)

(3) Find $\dfrac{dy}{dx}$ if $y = x^x$. (4)

Q – 6

(1) If $y = e^x \sin x$ then prove that $\dfrac{d^2y}{d^2x} - 2\dfrac{dy}{dx} + 2y = 0$. (5)

(2) The equation of motion of a particle is $s = t^3 + 3t$, $t > 0$. Find velocity and acceleration when t = 3 seconds. (5)

(3) Find $\dfrac{dy}{dx}$ if $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$. (4)

Q – 7

(1) Evaluate: $\int x\, e^x\, dx$ (5)

(2) Evaluate: $\int \dfrac{(1 - 3x)^2}{x^3}\, dx$ (5)

(3) Evaluate: $\int \dfrac{2x + 3}{x^2 + 3x - 1}\, dx$ (4)

Q – 8

(1) Prove that $\int_0^{\frac{\pi}{2}} \dfrac{\sec x}{\sec x + \cosec x}\, dx = \dfrac{\pi}{4}$ (5)

(2) Find the area of the standard circle $x^2 + y^2 = r^2$. (5)

(3) Evaluate: $\int_0^{10} W\, dx$ Where $W = \dfrac{3}{4}x\left(1 + \dfrac{x}{10}\right)$ (4)

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