Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2018

Subject Name : Advanced Mathematics

Subject Code : 2TE02AMT1 **Branch: Diploma (All)**

Semester : 2 **Date : 25/04/2018** **Time : 10:30 To 01:30** **Marks : 70**

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 **Attempt the following questions:** **(14)**

a) If P(– 5, 7) and Q(7, – 2) then PQ = _____.

(A) 15 (B) 169 (C) $\sqrt{29}$ (D) None of these

b) If A(2, –7) and B(4, 3) are the given points, find the midpoint of AB.

(A) $(-2,5)$ (B) $(3,-2)$ (C) $(2,5)$ (D) $(5,2)$

c) x – intercept of line 3x +2y – 7 = 0 is _____.

(A) 7/2 (B) –7/2 (C) 7/3 (D) – 7/3

d) Centre of the circle $2x^2+2y^2=5$ is _____ .

(A) $(0,0)$ (B) $(5,0)$ (C) $(0,5)$ (D) $(5/2,5/2)$

e) $\lim\limits_{x\to 0}\dfrac{5^x-1}{x}$ = _____

(A) 0 (B) e^5 (C) $\log_e 5$ (D) 1

f) $\lim\limits_{x\to 2}\dfrac{x^3-8}{x-2}$ = _____

(A) 4 (B) 0 (C) 1 (D) 12

g) $\lim\limits_{x\to 0}\dfrac{\sin 4x}{\tan 7x}$ = _____

(A) 7/4 (B) 4/7 (C) 1 (D) None of these

h) $\dfrac{d\left(\sqrt{x}\right)}{dx}$ = _____

(A) $\dfrac{1}{2\sqrt{x}}$ (B) $\dfrac{1}{\sqrt{x}}$ (C) $-\dfrac{1}{x^2}$ (D) $2\sqrt{x}$

i) $\dfrac{d\left(\tan x\right)}{dx}$ = _____

(A) $\cos ec^2 x$ (B) $-\cos ec^2 x$ (C) $-\sec^2 x$ (D) $\sec^2 x$

j) $\frac{d\left(x^x\right)}{dx} =$ _____

(A) $x^x \log x$ (B) $x^x\left(1+\log x\right)$ (C) $x\log x$ (D) $x\left(1+\log x\right)$

k) $\frac{d\left(\sin^{-1}x+\cos^{-1}x\right)}{dx} =$ _____

(A) $\frac{\pi}{2}$ (B) -1 (C) 0 (D) 1

l) $\int \sec x\, dx =$ _____

(A) $\log\left|\sec x+\tan x\right|+c$ (B) $\log\left|\cos ecx-\cot x\right|+c$ (C) $\log\left|\sec x\right|+c$

(D) $\log\left|\sin x\right|+c$

m) $\int \frac{1}{a^2+x^2}dx =$ _____

(A) $\frac{1}{a}\cot^{-1}\frac{x}{a}+c$ (B) $\cos^{-1}\frac{x}{a}+c$ (C) $\frac{1}{a}\tan^{-1}\frac{x}{a}+c$ (D) $\sin^{-1}\frac{x}{a}+c$

n) $\int_2^5 x^3\, dx =$ _____

(A) $\frac{641}{4}$ (B) $\frac{609}{4}$ (C) $\frac{690}{4}$ (D) $\frac{614}{4}$

Attempt any four questions from Q-2 to Q-8

Q-2 **Attempt all questions** **(14)**

a) In which ratio Y – axis divides line segment joining points (1, 2) and (2, 1)? Find co ordinates of division point. **(5)**

b) Find the equation of straight line passing through (4, 3) and perpendicular to line 4y – 3x + 7 = 0. **(5)**

c) If $f(x)=\frac{ax+b}{bx+a}$ then prove that $f(x)\cdot f\left(\frac{1}{x}\right)=1$. **(4)**

Q-3 **Attempt all questions** **(14)**

a) Prove that $\lim_{x\to 0}\frac{2\left(5^x\right)+3\left(2^x\right)-5}{x}=\log_e 200$. **(5)**

b) Evaluate: $\lim_{x\to\frac{\pi}{4}}\frac{2-\sec^2 x}{1-\tan x}$ **(5)**

c) Prove that the points (0, – 3), (1, – 2) and (10, 7) are collinear. **(4)**

Q-4 **Attempt all questions** **(14)**

a) Find equation of a circle passing through points (2, 0), (0, 2) and (0, 0). **(5)**

b) Find derivative of $f(x)=x^3-2x$ using definition. **(5)**

c) Find $\frac{dy}{dx}$ if $y=\frac{x^2-1}{x^2+1}$. **(4)**

Q-5 **Attempt all questions** **(14)**

a) Evaluate: $\lim_{x\to a}\frac{\sqrt{2a-x}-\sqrt{x}}{a-x}$ **(5)**

b) The equation of motion of a particle is $S = t^3 - 3t^2 + 4t + 3$. Find velocity and acceleration at $t = 2$. **(5)**

c) Find $\frac{dy}{dx}$ if $y = (\sin x)^x$. **(4)**

Q-6 **Attempt all questions** **(14)**

a) Evaluate: $\int \left[\sqrt{1+\sin 2x} + \sqrt{\frac{1+\cos 2x}{1-\cos 2x}} \right] dx$ **(5)**

b) Find $\frac{dy}{dx}$ if $e^x + e^y = e^{x+y}$. **(5)**

c) Evaluate: $\int x \log x \, dx$ **(4)**

Q-7 **Attempt all questions** **(14)**

a) Find $\frac{dy}{dx}$ if $y = \log\left(\frac{\sin x}{1+\cos x}\right)$. **(5)**

b) Evaluate: $\int \left(\sqrt{x} + \frac{1}{\sqrt{x}} \right)^2 dx$ **(5)**

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

Q-8 **Attempt all questions** **(14)**

a) Prove that $\int_0^{\frac{\pi}{2}} \frac{\tan x}{\tan x + \cot x} \, dx = \frac{\pi}{4}$. **(5)**

b) Find the volume of sphere of radius r. **(5)**

c) Find centre and radius of circle $x^2 + y^2 - 4x - 6y - 4 = 0$. **(4)**