

C.U.SHAH UNIVERSITY

Summer Examination-2019

Subject Name : Advanced Mathematics

Subject Code : 2TE02AMT1

Branch: Diploma (All)

Semester : 2

Date : 20/04/2019

Time : 02:30 To 05:30

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

- a) The distance between the points (2, 3) and (3, 4) is _____.
(A) $\sqrt{2}$ (B) $2\sqrt{2}$ (C) 25 (D) None of these
- b) If A(-7, 2) and B(3, 8) then mid-point of AB = _____.
(A) (-2,5) (B) (5,-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 $x^2 + y^2 = 25$ is _____.
(A) (0,5) (B) (5,0) (C) (0,0) (D) None of these
- e) $\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^{\frac{x}{2}} =$ _____.
(A) e^2 (B) e (C) $e^{1/2}$ (D) None of these
- f) $\lim_{\theta \rightarrow 0} \frac{\sin \theta}{5\theta} =$ _____.
(A) 1 (B) 0 (C) $1/5$ (D) 5
- g) $\lim_{x \rightarrow 0} \frac{x^2 + x + 1}{x + 1} =$ _____.
(A) -1 (B) 0 (C) 1 (D) None of these
- h) $\frac{d(\sec x)}{dx} =$ _____.
(A) $\tan x$ (B) $\tan^2 x$ (C) $-\tan x$ (D) $\sec x \tan x$
- i) $\frac{d(1/x)}{dx} =$ _____.
(A) $-\frac{1}{x^2}$ (B) $\frac{1}{x}$ (C) e (D) 1



- j) $\frac{d(\sin^{-1} x + \cos^{-1} x)}{dx} = \underline{\hspace{2cm}}$
 (A) $\frac{\pi}{2}$ (B) -1 (C) 0 (D) 1
- k) $\frac{d(x^2 + 2x + 7)}{dx} = \underline{\hspace{2cm}}$
 (A) $2x$ (B) $2x + 1$ (C) $2x + 2$ (D) None of these
- l) $\int e^x dx = \underline{\hspace{2cm}}$
 (A) $\log x + c$ (B) $e^x + c$ (C) 1 (D) 0
- m) $\int a^x dx = \underline{\hspace{2cm}}$
 (A) $\frac{a^x}{\log_e a} + c$ (B) $a^x \log_e a + c$ (C) $a^x + c$ (D) $\log_e a + c$
- n) $\int_2^5 x^3 dx = \underline{\hspace{2cm}}$
 (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 X – axis divides line segment joining points $(2, 2)$ and $(-3, 6)$? Find coordinates of division point. (5)
- b) Find the equation of perpendicular bisector to line joining points $(-1, 2)$ and $(1, -2)$. (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 $\lim_{x \rightarrow a} \frac{\sqrt{2a-x} - \sqrt{x}}{a-x} = \frac{1}{\sqrt{a}}$. (5)
- b) Evaluate: $\lim_{x \rightarrow 0} \frac{x \tan x}{1 - \cos x}$ (5)
- c) Prove that $(12, 8)$, $(-2, 6)$ and $(6, 0)$ are the vertices of an isosceles right angled triangle. (4)
- Q-4 Attempt all questions (14)**
- a) Find centre and radius of circle $2x^2 + 2y^2 - 8x + 4y + 2 = 0$. (5)
- b) Find derivative of $f(x) = x^3 - 2x$ using definition. (5)
- c) If $y = \frac{\log x}{x}$ then find $\frac{dy}{dx}$ at $x = 1$. (4)
- Q-5 Attempt all questions (14)**
- a) Evaluate: $\lim_{n \rightarrow \infty} \frac{1^3 + 2^3 + \dots + n^3}{n^2(1 + 2 + \dots + n)}$ (5)



b) $S = t^3 - 6t^2 + 9t + 6$ gives the distance travelled by a body in t seconds. (5)
Find velocity and acceleration at $t = 4$ seconds.

c) Find $\frac{dy}{dx}$ if $y = (e^{3x} + 1)^{2x+5}$. (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) If $y = 2e^{-3x} + 3e^{2x}$ then prove that $\frac{d^2y}{dx^2} + \frac{dy}{dx} - 6y = 0$. (5)

c) Evaluate: $\int x\sqrt{x^2 - a^2} dx$ (4)

Q-7

Attempt all questions (14)

a) Find $\frac{dy}{dx}$ if $y = \log \sqrt{\frac{a+x}{a-x}}$. (5)

b) Evaluate: $\int \frac{x^4 + x^2 + 1}{x^2 + 1} dx$ (5)

c) Evaluate: $\int x^n \log x dx$ (4)

Q-8

Attempt all questions (14)

a) Prove that $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx = \frac{\pi}{4}$. (5)

b) Find the area of the region bounded between curve $y = x^2$ and straight – line $x = 2$. (5)

c) If the radius of a circle $x^2 + y^2 - 4x - 8y + k = 0$ is 4, find k . (4)

