

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 $PQ = \underline{\hspace{2cm}}$.
(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 $\underline{\hspace{2cm}}$.
(A) $7/2$ (B) $-7/2$ (C) $7/3$ (D) $-7/3$
- d) Centre of the circle $2x^2 + 2y^2 = 5$ is $\underline{\hspace{2cm}}$.
(A) $(0, 0)$ (B) $(5, 0)$ (C) $(0, 5)$ (D) $(5/2, 5/2)$
- e) $\lim_{x \rightarrow 0} \frac{5^x - 1}{x} = \underline{\hspace{2cm}}$
(A) 0 (B) e^5 (C) $\log_e 5$ (D) 1
- f) $\lim_{x \rightarrow 2} \frac{x^3 - 8}{x - 2} = \underline{\hspace{2cm}}$
(A) 4 (B) 0 (C) 1 (D) 12
- g) $\lim_{x \rightarrow 0} \frac{\sin 4x}{\tan 7x} = \underline{\hspace{2cm}}$
(A) $7/4$ (B) $4/7$ (C) 1 (D) None of these
- h) $\frac{d(\sqrt{x})}{dx} = \underline{\hspace{2cm}}$
(A) $\frac{1}{2\sqrt{x}}$ (B) $\frac{1}{\sqrt{x}}$ (C) $-\frac{1}{x^2}$ (D) $2\sqrt{x}$
- i) $\frac{d(\tan x)}{dx} = \underline{\hspace{2cm}}$
(A) $\cos ec^2 x$ (B) $-\cos ec^2 x$ (C) $-\sec^2 x$ (D) $\sec^2 x$



- j) $\frac{d(x^x)}{dx} = \underline{\hspace{2cm}}$
 (A) $x^x \log x$ (B) $x^x(1 + \log x)$ (C) $x \log x$ (D) $x(1 + \log x)$
- k) $\frac{d(\sin^{-1} x + \cos^{-1} x)}{dx} = \underline{\hspace{2cm}}$
 (A) $\frac{\pi}{2}$ (B) -1 (C) 0 (D) 1
- l) $\int \sec x \, dx = \underline{\hspace{2cm}}$
 (A) $\log|\sec x + \tan x| + c$ (B) $\log|\cos ecx - \cot x| + c$ (C) $\log|\sec x| + c$
 (D) $\log|\sin x| + c$
- m) $\int \frac{1}{a^2 + x^2} \, dx = \underline{\hspace{2cm}}$
 (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) $\int_2^5 x^3 \, dx = \underline{\hspace{2cm}}$
 (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 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 $\lim_{x \rightarrow 0} \frac{2(5^x) + 3(2^x) - 5}{x} = \log_e 200$. (5)
- b) Evaluate: $\lim_{x \rightarrow \frac{\pi}{4}} \frac{2 - \sec^2 x}{1 - \tan x}$ (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: $\lim_{x \rightarrow a} \frac{\sqrt{2a-x} - \sqrt{x}}{a-x}$ (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)

