

C.U.SHAH UNIVERSITY

Summer Examination-2017

Subject Name : Advanced Mathematics

Subject Code : 2TE02AMT1

Branch: Diploma(All)

Semester : 2

Date : 04/05/2017

Time : 02:00 To 05:00

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 A(-7, 2) and B(3, 8) then midpoint of AB = _____.
 (a) (-2, 5) (b) (5, -2) (c) (2, 5) (d) (5, 2)
- b) x - intercept of line $2x - 6y + 4 = 0$ is _____.
 (a) -2/3 (b) 2/3 (c) -2 (d) 2
- c) If A(-3, 5) and B(2, -4) are two points, find slope of AB = _____.
 (a) -9/5 (b) 9/5 (c) -5/9 (d) 5/9
- 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) $\lim_{x \rightarrow 0} x \left[\sqrt[3]{7} - 1 \right] =$ _____
 (a) e (b) $\log_7 e$ (c) $\log_e 7$ (d) None of these
- f) $\lim_{x \rightarrow 2} \frac{x^2 + x - 2}{x - 1} =$ _____
 (a) 1 (b) 0 (c) -1 (d) None of these
- g) $\lim_{x \rightarrow 0} \frac{\sin x}{x} =$ _____
 (a) -1 (b) 0 (c) 1 (d) None of these
- h) $\frac{d(k)}{dx} =$ _____. (Where k = constant)
 (a) 0 (b) kx^{k-1} (c) kx (d) None of these
- i) $\frac{d(\sin^2 x + \cos^2 x)}{dx} =$ _____
 (a) 2 (b) 1 (c) 0 (d) None of these
- j) $\frac{d(\tan x)}{dx} =$ _____
 (a) $-\operatorname{cosec}^2 x$ (b) $\operatorname{cosec}^2 x$ (c) $\sec^2 x$ (d) $-\sec^2 x$



- k) If $f(x) = \log x$ then $f'(1) = \underline{\hspace{2cm}}$
 (a) 0 (b) $\frac{1}{2} \log 2$ (c) $2 \log 2$ (d) 1
- l) $\int \frac{1}{x^2+1} dx = \underline{\hspace{2cm}}$
 (a) $\tan^{-1} x + c$ (b) $\sin^{-1} x + c$ (c) $\cos^{-1} x + c$ (d) $\cot^{-1} x + c$
- m) $\int \frac{1}{\sqrt{x^2-25}} dx = \underline{\hspace{2cm}}$
 (a) $\cot^{-1} \frac{x}{2} + c$ (b) $\tan^{-1} \frac{x}{2} + c$ (c) $\log \left| x + \sqrt{x^2-25} \right| + c$ (d) none of these
- n) $\int_2^5 \frac{1}{x} dx = \underline{\hspace{2cm}}$
 (a) $\log \frac{2}{5}$ (b) $\log \frac{5}{2}$ (c) $\log 10$ (d) None of these

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

- Q-2 Attempt all questions (14)**
- a) Evaluate: $\lim_{\theta \rightarrow 0} \frac{\operatorname{cosec} \theta - \cot \theta}{\theta}$ (5)
- b) Prove that $\lim_{x \rightarrow 3} \frac{\sqrt{x+2} - \sqrt{5}}{\sqrt{x+4} - \sqrt{7}} = \frac{\sqrt{35}}{5}$ (5)
- c) If (3, 8), (4, 2) and (-1, 5) are the vertices of a triangle, find the co ordinates of its centroid. (4)
- Q-3 Attempt all questions (14)**
- a) Find equation of a circle passing through points (1, 0), (0, 1) and (0, 0). (5)
- b) In which ratio Y – axis divides line segment joining points (1, 2) and (2, 1)? Find co ordinates of division point. (5)
- c) Evaluate: $\lim_{x \rightarrow (-1)} \frac{x^{41} + 1}{x^{43} + 1}$ (4)
- Q-4 Attempt all questions (14)**
- a) Prove that the points (0, -3), (1, -2) and (10, 7) are collinear. (5)
- b) Find the equation of straight line passing through (3, 4) and parallel to line $\frac{x}{2} + \frac{y}{2} = 1$. (5)
- c) If radius of a circle $x^2 + y^2 - 4x - 8y + k = 0$ is 4, find k. (4)
- Q-5 Attempt all questions (14)**
- a) Find derivative of $f(x) = \sqrt{x}$ using definition. (5)
- b) Find $\frac{dy}{dx}$ if $y = \log \sqrt{\frac{1+\sin x}{1-\sin x}}$ (5)
- c) Prove that if $f(x) = \log \left(\frac{x-1}{x} \right)$ then prove that $f(x) + f(-x) = f(x^2)$. (4)
- Q-6 Attempt all questions (14)**



a) If $y = A \cos pt + B \sin pt$ then prove that $\frac{d^2y}{dt^2} + p^2y = 0$. (5)

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

c) Evaluate: $\int \frac{1}{\sin^2 x \cos^2 x} dx$ (4)

Q-7

Attempt all questions

(14)

a) Evaluate: $\int \frac{e^x(1+x)}{\cos^2(xe^x)} dx$ (5)

b) Evaluate: $\int x^n \log x dx$ (5)

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

Q-8

Attempt all questions

(14)

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

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

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

