



XI-SCI : Maths
Continuity,

DATE:

TIME: 1 Hours 30
Minutes

MARKS: 25

SEAT NO:

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Note:-

1. All Questions are compulsory.
2. Numbers on the right indicate full marks.

Section A

Q.1. Select and write the correct answer.

(4)

1. If $f(x) = \frac{1 - \sqrt{2} \sin x}{\pi - 4x}$, for $x \neq \frac{\pi}{4}$ is continuous at $x = \frac{\pi}{4}$, then $f\left(\frac{\pi}{4}\right) =$

- A) $\frac{1}{\sqrt{2}}$ B) $-\frac{1}{\sqrt{2}}$
C) $-\frac{1}{4}$ D) $\frac{1}{4}$

2. $f(x) = \frac{(16^x - 1)(9^x - 1)}{(27^x - 1)(32^x - 1)}$, for $x \neq 0 = k$, for $x = 0$ is continuous at $x = 0$, then 'k'

- A) $\frac{8}{3}$ B) $\frac{8}{15}$
C) $-\frac{8}{15}$ D) $\frac{20}{3}$

Q.2. Answer the following.

(3)

1. Examine whether the function is continuous at the points indicated against them.

$$f(x) = \frac{x^2 + 18x - 19}{x - 1}, \text{ for } x \neq 1$$

$= 20$, for $x = 1$, at $x = 1$

2. Examine the continuity of

$$f(x) = x^3 + 2x^2 - x - 2 \text{ at } x = -2$$

3. Examine whether the function is continuous at the points indicated against them.

$$f(x) = \begin{cases} x^3 - 2x + 1, & \text{if } x \leq 2 \\ 3x - 2 & \text{if } x > 2, \text{ at } x = 2 \end{cases}$$

Section B

Attempt any Four

Q.3 Solve using intermediate value theorem. Show that $5^x - 6x = 0$ has a root in $[1, 2]$ **(2)**

Q.4 Identify discontinuities if any for the following functions as either a jump or a removable discontinuity on their respective domains. **(2)**

$$f(x) = \begin{cases} x^2 + x - 3, & \text{for } x \in [-5, -2) \\ x^2 - 5 & , \text{for } x \in (-2, 5] \end{cases}$$

- Q.5 Identify discontinuities if any for the following functions as either a jump or a removable discontinuity on their respective domains. (2)

$$f(x) = x^2 + 5x + 1, \text{ for } 0 \leq x \leq 3$$

$$= x^3 + x + 5, \text{ for } 3 < x \leq 6$$

- Q.6 Show that there is a root for the equation $2x^3 - x - 16$ between 2 and 3. (2)

- Q.7 Show that following function have continuous extension to the point where $f(x)$ is not defined. Also find the extension (2)

$$f(x) = \frac{1 - \cos 2x}{\sin x} \text{ at } x \neq 0$$

- Q.8 Which of the following functions has a removable discontinuity? If it has a removable discontinuity, redefine the function so that it becomes continuous. (2)

$$f(x) = 3x + 2, \text{ for } -4 \leq x \leq -2$$

$$= 2x - 3, \text{ for } -2 < x \leq 6$$

Section C
Attempt any Two

- Q.9 Show that following function have continuous extension to the point where $f(x)$ is not defined. Also find the extension (3)

$$f(x) = \frac{3 \sin^2 x + 2 \cos x (1 - \cos 2x)}{2 (1 - \cos^2 x)}, \text{ for } x \neq 0$$

- Q.10 Discuss the continuity of the following functions at the points indicated against them (3)

$$f(x) = \frac{\sqrt{2 + \sin x} - \sqrt{3}}{\cos^2 x}, \text{ } x \neq \frac{\pi}{2}$$

is continuous at $x = \frac{\pi}{2}$ then find $f\left(\frac{\pi}{2}\right)$

- Q.11 Identify discontinuities for the following functions as either a jump or a removable discontinuity. (3)

$$f(x) = x^2 - 3x - 2, \text{ for } x < -3$$

$$= 3 + 8x, \text{ for } x > -3$$

Section D
Attempt any One

- Q.12 Discuss the continuity of the following functions at the points indicated against them. (4)

$$\text{If } f(x) = \frac{24^x - 8^x - 3^x + 1}{12^x - 4^x - 3^x + 1}; \text{ for } x \neq 0 = k;$$

for $x = 0$ is continuous at $x = 0$, find k .

- Q.13 Discuss the continuity of the following functions at the points(s) or on the interval indicated against them. (4)

$$f(x) = \frac{x^2 - 3x - 10}{x - 5} \text{ for } 3 \leq x \leq 6, x \neq 5$$

$$= 10, \text{ for } x = 5$$

$$= \frac{x^2 - 3x - 10}{x - 5}, \text{ for } 6 < x \leq 9$$