

MULTIPLE CHOICE.

Q1. B

$$f(x) = \frac{4x^4 - 12x^2}{3x}$$

$$= \frac{4x^3 - 4x}{3}$$

$$\therefore f'(x) = 4x^2 - 4$$

Q2. C

$$f(x) = 5 + 5(7-x)^{-2}$$

$$\therefore f'(x) = 5 \times -2(7-x)^{-3} \times -1$$

$$= \frac{10}{(7-x)^3}$$

$$\therefore f'(x) > 0 \text{ if } 7-x > 0 \therefore x < 7$$

Q3. A

$$y = f(2x^4)$$

$$\therefore \frac{dy}{dx} = f'(2x^4) \times 8x^3$$

Q4. A

$$f'(x) = \frac{1}{3} x^{-2/3} = \frac{1}{3x^{2/3}}$$

$\therefore f'(x)$  is undefined at  $x=0$ .

Q5. B

$$y = \frac{k}{2(x^3+1)} \quad \text{Given: } f'(1) = 1$$

$$y = \frac{k}{2} (x^3+1)^{-1}$$

$$\therefore \frac{dy}{dx} = \frac{k}{2} \times -1 \times (x^3+1)^{-2} \times 3x^2$$

$$\therefore \left. \frac{dy}{dx} \right|_{x=1} = -\frac{k}{2} \times (2)^{-2} \times 3(1)^2$$

$$= -\frac{k}{2} \times \frac{1}{4} \times 3$$

$$= -\frac{3k}{8}$$

$$\therefore 1 = -\frac{3k}{8}$$

$$\therefore k = -\frac{8}{3}$$

Q6. C

Q7. D

$$f(x) = 8x - 12x^2$$

$$f'(x) = 8 - 24x$$

$$f'(x) < 0 \quad \text{for } 8 < 24x$$

$$\therefore x > \frac{1}{3}$$

Q8. E

$$y = (3 - 2f(x))^{1/2}$$

$$\therefore \frac{dy}{dx} = \frac{1}{2} (3 - 2f(x))^{-1/2} \times (-2f'(x)) \quad (\text{Chain Rule})$$

$$= -\frac{f'(x)}{\sqrt{3 - 2f(x)}}$$

$$\sqrt{3 - 2f(x)}$$

Q9. A

$$y = (x+3)(x-2)$$

$$\therefore y = x^2 + x - 6$$

$$\frac{dy}{dx} = 2x + 1$$

$$\therefore 2x + 1 = -7$$

$$x = -4$$

$$\text{When } x = -4, y = (-4+3)(-4-2) = 6$$

$\therefore$  The point is  $(-4, 6)$

Q10. B

$$y = ax^2 - bxc$$

$$f'(2) = 0$$

$$\therefore f'(x) = 2ax - b$$

$$\therefore 4a - b = 0$$

$$\therefore a = \frac{b}{4}$$

$$\therefore \text{Equation: } y = \frac{b}{4}x^2 - bxc$$

$$= bxc \left( \frac{x}{4} - 1 \right)$$

$$y = 0 \text{ if } bxc \left( \frac{x}{4} - 1 \right) = 0$$

$$\therefore \begin{array}{cc} \downarrow & \downarrow \\ x=0 & \frac{x}{4} - 1 = 0 \end{array}$$

$$\therefore x = 0, 4$$