Theorems

ascending

Dec. 2014)

 $(x + 2)^{5}$ in May 2008)

 $(x-1)^4$ in

May 2004)

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MULTIPLE CHOICE QUESTIONS

Type I: Maclaurin's Theorem and Expansion of Functions:

Expansion of f(x) in ascending powers of x by Maclaurin's theorem is

(A)
$$f(x) + xf'(x) + \frac{x^2}{2!}f''(x) + ...$$

(B)
$$1 + x + \frac{x^2}{2!} + \dots$$

(C)
$$f(0) + xf'(0) + \frac{x^2}{2!}f''(0) + ...$$

(D)
$$f(x) - xf'(x) + \frac{x^2}{2!}f''(x) - \frac{x^3}{3!}f''(x) + \dots$$

Expansion of sin x in ascending powers of x is

(A)
$$x + \frac{x^3}{3!} + \frac{x^5}{5!} + \dots$$

(B)
$$x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$$

$$(x) x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots$$

(D)
$$1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$$

Expansion of cos x in ascending powers of x is

(1)

(1)

(1)

(A)
$$1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + \dots$$

(B)
$$x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots$$

(C)
$$x + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + \dots$$

(D)
$$1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \dots$$

4. Expansion of $\tan x$ in ascending powers of x is

(1)

(A)
$$1 + x + \frac{1}{3}x^3 + \frac{2}{15}x^5 + \dots$$

(B)
$$x - \frac{1}{3}x^3 + \frac{2}{15}x^5 - \dots$$

(C)
$$x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots$$

(C)
$$x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots$$
 (D) $x + \frac{1}{3}x^3 + \frac{2}{15}x^5 + \dots$

Expansion of ex in ascending powers of x is

(1)

(1)

(1)

(A)
$$1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$$

(B)
$$1 - x + \frac{x^2}{2!} - \frac{x^3}{3!} + \dots$$

(C)
$$1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \dots$$

(D)
$$x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots$$

6. Expansion of e-x in ascending powers of x is

(A) $1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$

(B)
$$1-x+\frac{x^2}{2!}-\frac{x^3}{3!}+\dots$$

(C)
$$1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \dots$$

(D)
$$x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots$$

7. Expansion of sinh x in ascending powers of x is

(A)
$$1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$$

(B)
$$x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots$$

(C)
$$1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + \dots$$

(D)
$$x + \frac{x^3}{3!} + \frac{x^5}{5!} + \frac{x^7}{7!} + \cdots$$

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- Expansion of cosh x in ascending powers of x is
 - (A) $1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$
- (B) $x \frac{x^3}{3!} + \frac{x^5}{5!} \frac{x^7}{7!} + \dots$
- (C) $1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + \dots$
- (D) $x + \frac{x^3}{3!} + \frac{x^5}{5!} + \frac{x^7}{7!} + \dots$
- 9. Expansion of tanh x in ascending powers of x is
 - (A) $1 + x + \frac{1}{3}x^3 + \frac{2}{15}x^5 + \dots$
- (B) $x \frac{1}{3}x^3 + \frac{2}{15}x^5 \dots$
- (C) $x \frac{x^3}{21} + \frac{x^5}{51} \frac{x^7}{71} + \dots$
- (D) $x + \frac{1}{3}x^3 + \frac{2}{15}x^5 + \dots$
- 10. Expansion of $\log (1 + x)$ in ascending powers of x is
 - (A') $x \frac{x^2}{2} + \frac{x^3}{3} \frac{x^4}{4} + \dots$
- (B) $-x \frac{x^2}{2} \frac{x^3}{3} \frac{x^4}{4} + \dots$
- (C) $1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + \dots$
- (D) $x + \frac{x^3}{31} + \frac{x^5}{51} + \frac{x^7}{71} + \dots$
- 11. Expansion of $\log (1-x)$ in ascending powers of x is
 - (A) $-x \frac{x^2}{2} \frac{x^3}{3} \frac{x^4}{4} \dots$
- (B) $x \frac{x^2}{2} + \frac{x^3}{3} \frac{x^4}{4} + \dots$
- (C) $1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + \dots$
- (D) $x + \frac{x^3}{31} + \frac{x^5}{51} + \frac{x^7}{71} + \dots$
- 12. Expansion of $\frac{1}{(1-x)}$ in ascending powers of x is (A) $-1 - x - x^2 - x^3 - \dots$
 - (B) $1-x+x^2-x^3+...$
 - (C) $1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + \dots$
- (D) 1 + x + x^2 + x^3 + ...
- 13. Expansion of $\frac{1}{(1+x)}$ in ascending powers of x is
- (B) $1-x+x^2-x^3+...$
- (C) $1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + \dots$
- (D) $1 + x + x^2 + x^3 + \dots$
- 14. Expansion of $(1 + x)^n$ in ascending powers of x is
 - (A) $1 nx + \frac{n(n-1)}{2!}x^2 \frac{n(n-1)(n-2)}{3!}x^3 + \dots$
 - (B) $1 nx + \frac{n(n+1)}{2!}x^2 \frac{n(n+1)(n+2)}{3!}x^3 + \dots$
 - (C) $1 + nx + \frac{n(n+1)}{2!}x^2 + \frac{n(n+1)(n+2)}{3!}x^3 + \dots$
 - (D) $1 + nx + \frac{n(n-1)}{2!}x^2 + \frac{n(n-1)(n-2)}{3!}x^3 + \dots$

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(A)

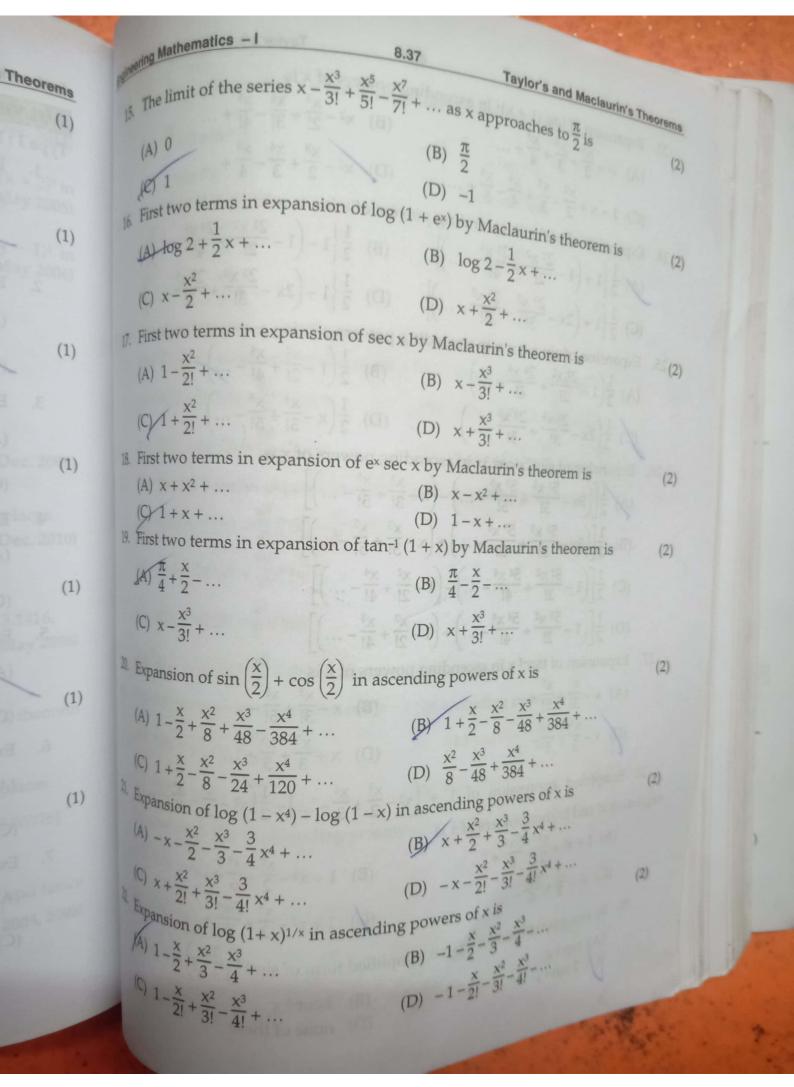
(C)]

21. Expan

(A) _

(C) x 2 Expans

(A) 1.

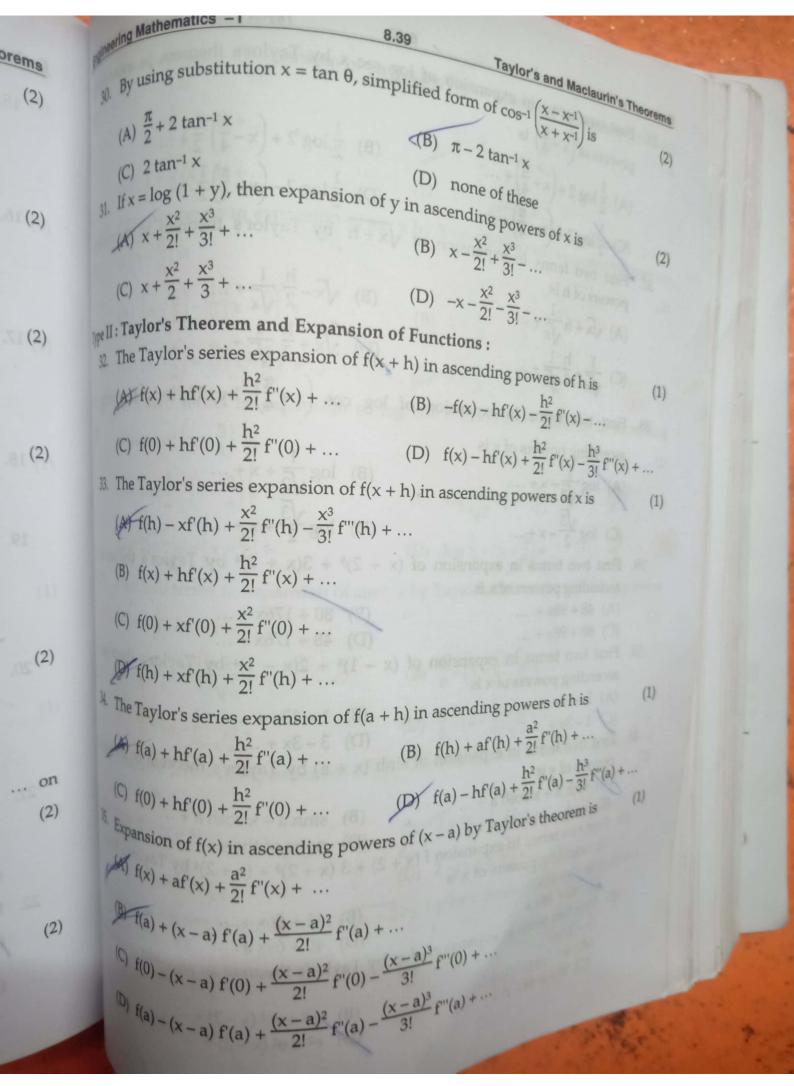


(B) 2 cot-1 x

(D) none of these

(C) 2 tan-1 x

(0)



36. First two terms in expansion of log sec x by Taylor's theorem in ascending

powers of $\left(x - \frac{\pi}{4}\right)$ is

(A)
$$\frac{1}{2} \log 2 - \left(x - \frac{\pi}{4}\right) + \dots$$

(B)
$$\frac{1}{2} \log 2 + \left(x - \frac{\pi}{4}\right) \frac{1}{2} + \dots$$

$$(C) \frac{1}{2} \log 2 + \left(x - \frac{\pi}{4}\right) + \dots$$

(A)
$$\frac{1}{2}\log 2 + \left(x - \frac{\pi}{4}\right) + \dots$$
 (D) $\frac{1}{2}\log 2 - \left(x - \frac{\pi}{4}\right)\frac{1}{2}\dots$

37. First two terms in expansion of $\sqrt{x+h}$ by Taylor's theorem in ascending powers of h is

(A)
$$\sqrt{x} + h \frac{1}{\sqrt{x}} + \dots$$

(B)
$$\sqrt{x} - \frac{h}{2} \frac{1}{\sqrt{x}} + \dots$$

(C)
$$\frac{1}{\sqrt{x}} + \frac{h}{2} \frac{1}{\sqrt{x}} + \dots$$

$$\sqrt{x} + \frac{h}{2} \frac{1}{\sqrt{x}} + \dots$$

38. First two terms in expansion of log cos $\left(x + \frac{\pi}{4}\right)$ by Taylor's theorem in

ascending powers of x is

(B) $\log \frac{1}{\sqrt{2}} + x + \dots$

(A)
$$\log \frac{1}{\sqrt{2}} - x + \dots$$

(C) $\log \frac{\sqrt{3}}{2} - x + \dots$

(D)
$$\log \frac{\sqrt{3}}{2} + x + \dots$$

39. First two terms in expansion of $(x + 2)^5 + 3(x + 2)^4$ by Taylor's theorem in ascending powers of x is

(A) 48 + 98x + ...

(B) 80 + 176x + ...

(C) 80 + 98x + ...

40. First two terms in expansion of $(x - 1)^5 + 2(x - 1)^4$ by Taylor's theorem in ascending powers of x is

(A) 3-13x+... (B) 1+13x+...

(9) 1-3x+...

(D) 3-3x+...

41. First two terms in expansion of sinh (x + a) by Taylor's theorem in ascending powers of x is

(B) sinh $a + x \cosh a + ...$ (B) sinh $a - x \cosh a + ...$

(C) cosh a + x sinh a + ... (D) none of these 42. First two terms in expansion $f(x + 2) + 3(x + 2)^3 + (x + 2)^4$ by Taylor's theorem in ascending powers of in ascending powers of x is

(A) 42+68x+...

(B) 42 + 66x + ...

42 + 69x + ...

43. First two terms in expansion of e^x by Taylor's theorem in ascending powers of (x-2) is

(A) $e^{-2} - e^2(x-2) + ...$

(C) $e^2 - e^2(x-2) + ...$

(B) $e^{-2} + e^{-2}(x-2) + \cdots$ (D) $e^2 + e^2(x-2) + \cdots$

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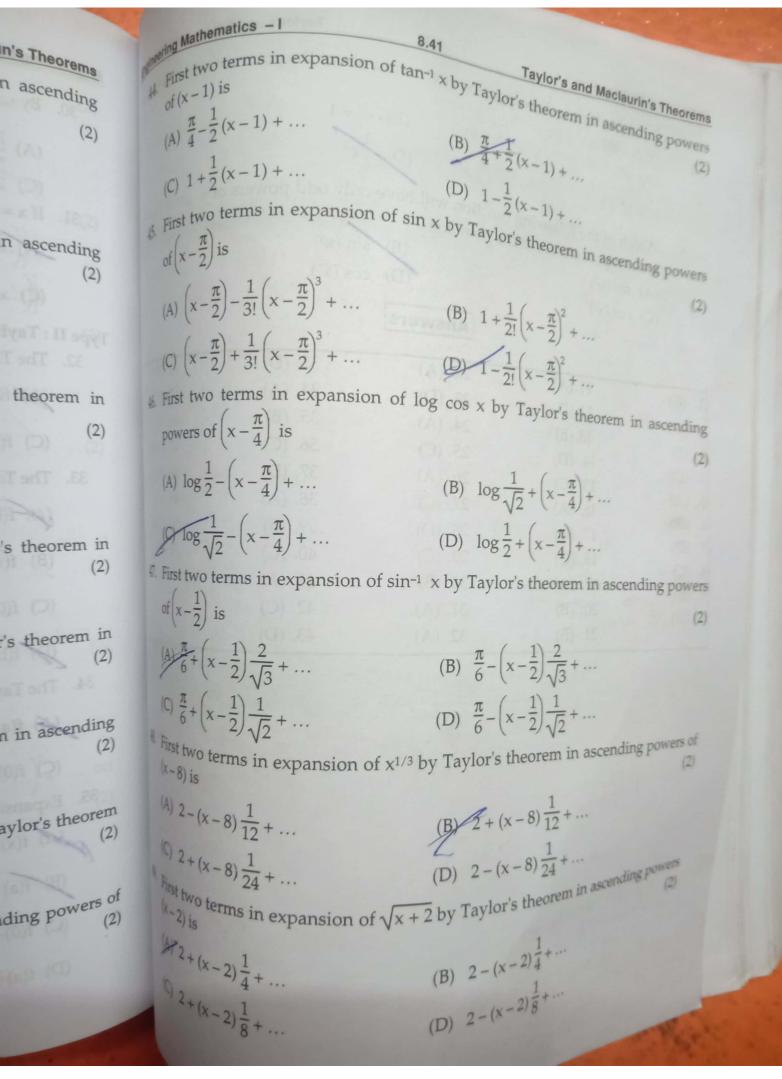
48. First (X-8

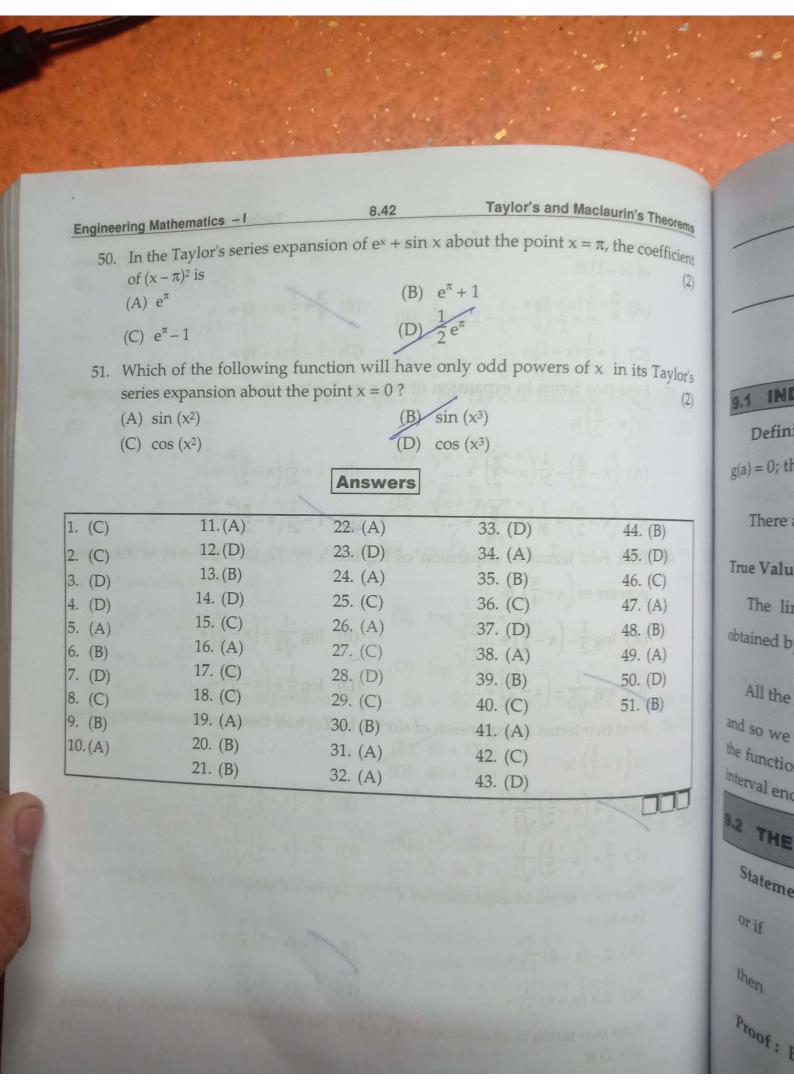
(A)

(C)

49. First

(x-2





(1)

8.

9.

10.

MULTIPLE CHOICE QUESTIONS

Type I: Indeterminate Forms $\left(\frac{0}{0}, \frac{\infty}{\infty}, 0 \times \infty, \infty - \infty\right)$

1. If f(x) and g(x) be functions such that f(a) = 0 and g(a) = 0 then $\lim_{x \to a} \frac{f(x)}{g(x)}$ is equal to

(A) $\lim_{x \to a} \frac{f'(x)}{g'(x)}$

(B) $\lim_{x \to a} \frac{g'(x)}{f'(x)}$

(C) $\frac{f(a)}{g(a)}$

- (D) none of these
- 2. If f(x) and g(x) be functions such that f(a) = 0, g(a) = 0 and f'(a) = 0, g'(a) = 0 then $\lim_{x \to a} \frac{f(x)}{g(x)}$ is equal to (1)

 $(A) \ \frac{f'(a)}{g'(a)}$

(B) $\lim_{x \to a} \frac{g'(x)}{f'(x)}$

(C) $\lim_{x \to a} \frac{f'(x)}{g''(x)}$

- (D) none of these
- 3. If f(x) and g(x) be functions such that $f(a) = \infty$ and $g(a) = \infty$ then $\lim_{x \to a} \frac{f(x)}{g(x)}$ is equal to

 $\lim_{x \to a} \frac{f'(x)}{g'(x)}$

(B) $\lim_{x \to a} \frac{g'(x)}{f'(x)}$

(C) $\frac{f(a)}{g(a)}$

(D) none of these

4. $\lim_{X \to \pi/2} \frac{1 - \sin x}{\cos x}$ is equal to

(1)

(A) 1

(C) $\frac{1}{2}$

(B) 0

5. $\lim_{x \to 0} \frac{\sin x}{x}$ is equal to

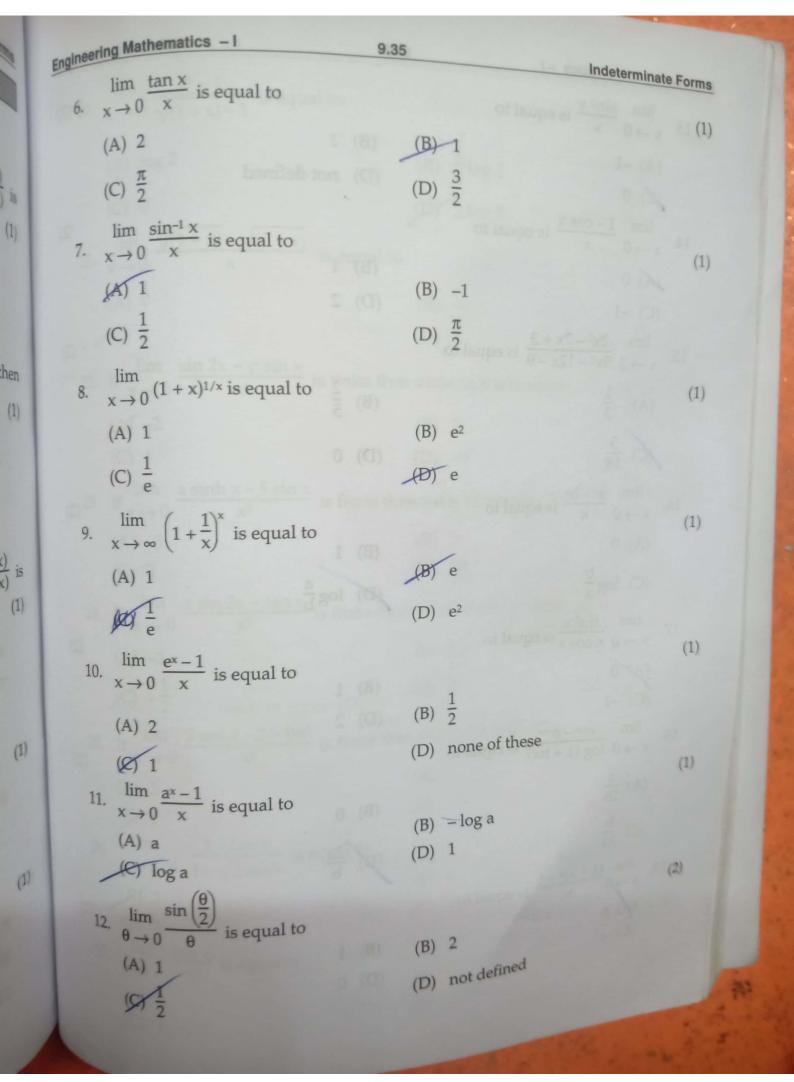
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(A) 2

(C) -1

(B) 0

(D) 1



13. $\lim_{x \to 0} \frac{\sin^2 x}{x}$ is equal to

(A) -1

100

 $\lim_{x \to 0} \frac{1 - \cos x}{x} \text{ is equal to}$

(A) 0

(C) -1

15. $\lim_{x \to 3} \frac{2x^2 - 7x + 3}{5x^2 - 12x - 9}$ is equal to

(A) $-\frac{1}{3}$

 $(c) \frac{5}{18}$

16. $\lim_{x \to 0} \frac{a^x - b^x}{x}$ is equal to

(A) 0

(C) $\log \frac{b}{a}$

17. $\lim_{x \to 0} \frac{\sin^2 x}{x \cos x}$ is equal to

(A) 0

(C) -1

18. $\lim_{x \to 0} \frac{e^{ax} - e^{-ax}}{\log(1 + bx)}$ is equal to

 $(A) \frac{a}{2b}$

(C) $\frac{b}{2a}$

19. $\lim_{x \to 0} \frac{(1+x)^n - 1}{x}$ is equal to
(A) n

(B) 1

(D) not defined

(B) 1

(D) 2

(B) $\frac{2}{5}$

(D) 0

(B) 1

(D) $\log \frac{a}{b}$

(B) 1

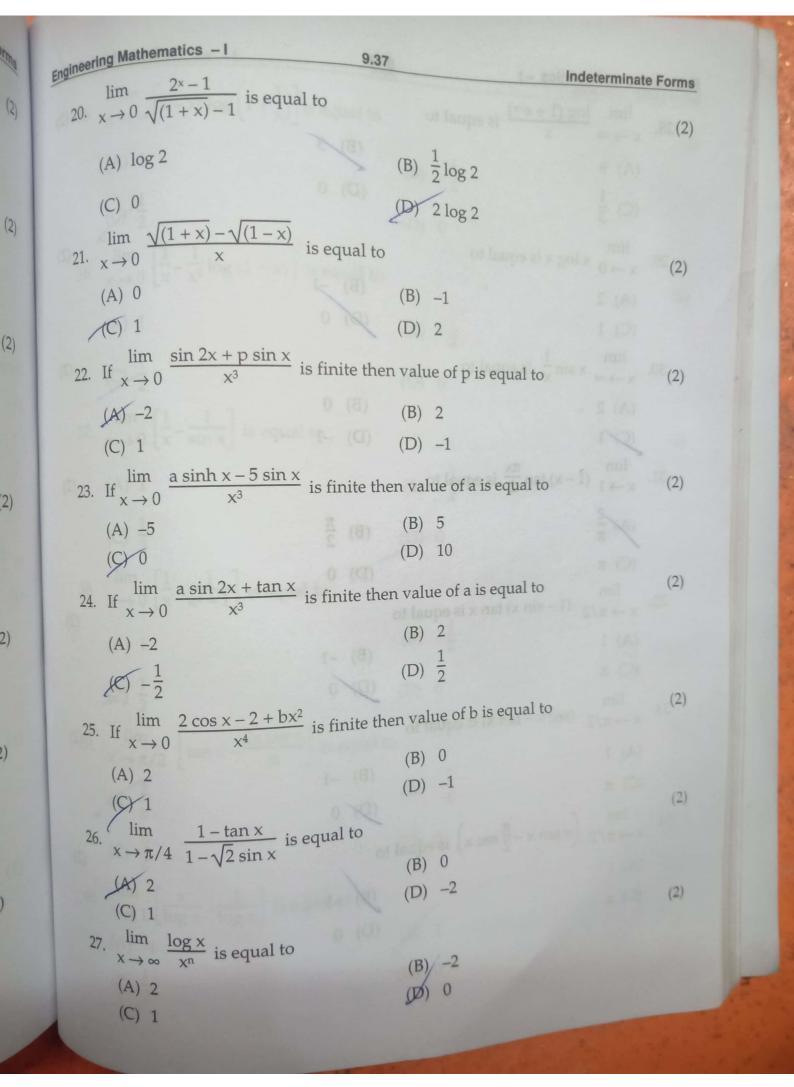
(D) 2

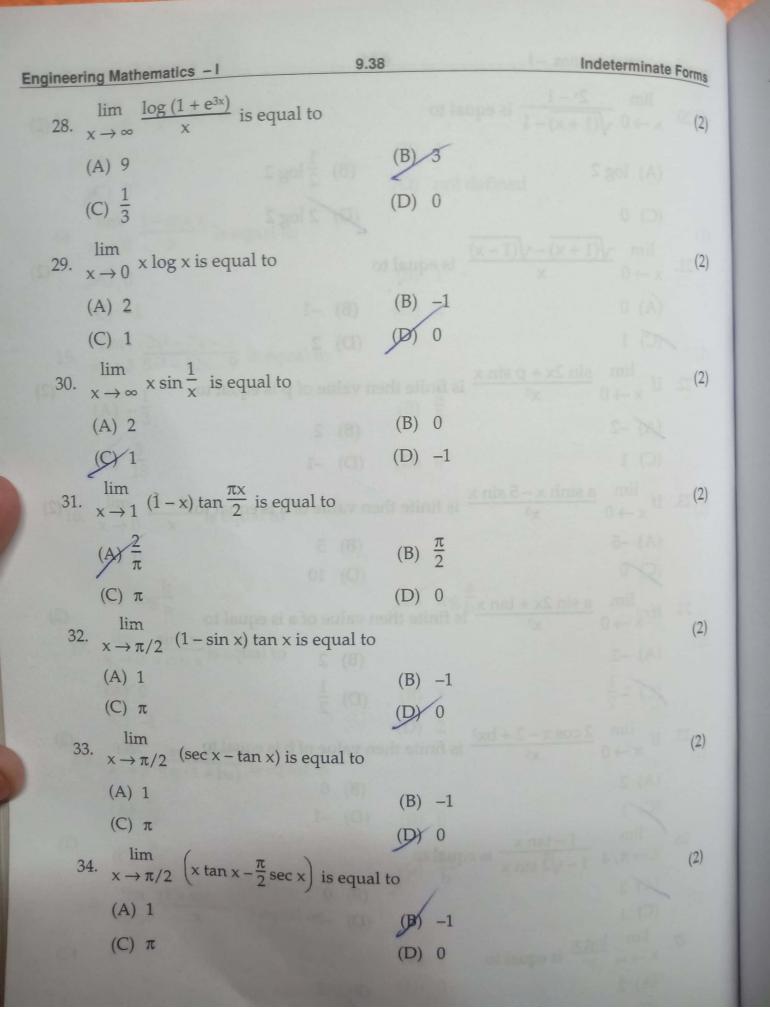
(B) 0

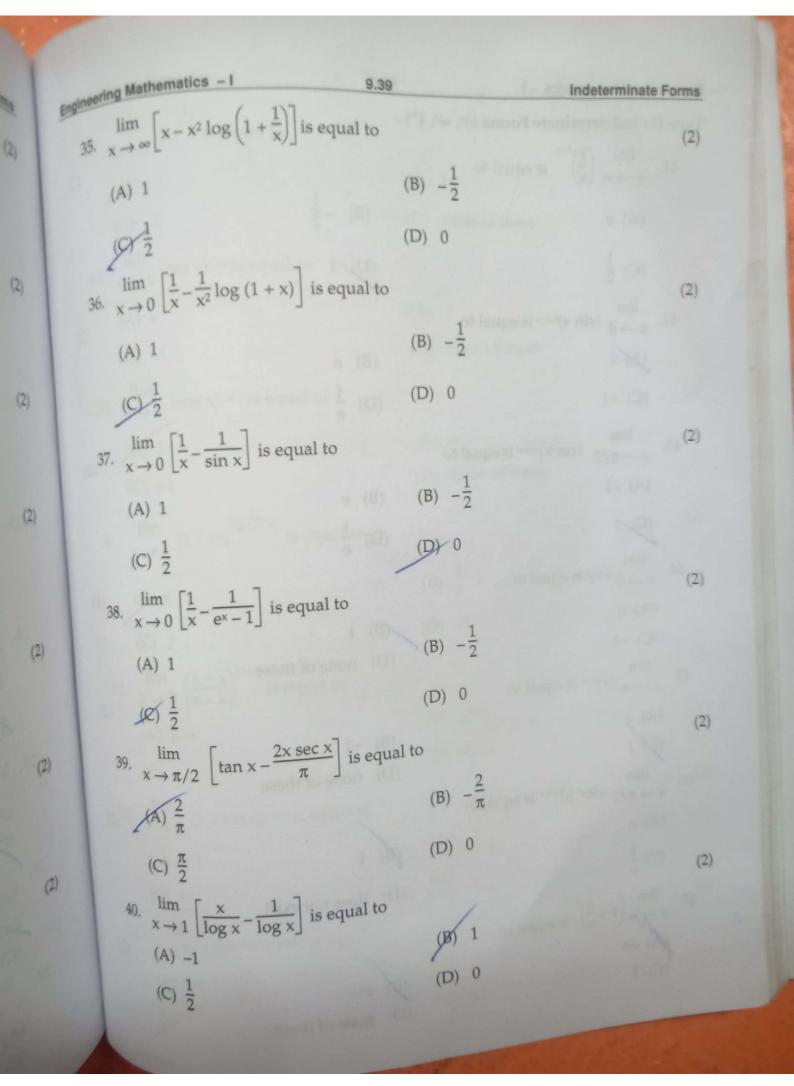
(D) $\frac{2a}{b}$

(B) 1

(D) 0







Type II : Indeterminate Forms $(0^0, \infty^0, 1^\infty)$:

41. $\lim_{x \to \infty} \left(\frac{1}{x}\right)^{1/x}$ is equal to

(2)

(A) e

(B) $-\frac{1}{2}$

(C) $\frac{1}{2}$

 $(\sin x)^{\tan x}$ is equal to

(2)

(A) 1

(B) e

(C) -1

43. $\lim_{x \to \pi/2} (\cos x)^{\cos x}$ is equal to

(2)

(2)

(A) -1

(B) e

(C) 1

(D) $\frac{1}{e}$

44. $\lim_{x \to 0} (x)^x$ is equal to

- (A) e
- (B) 1

(C) -1

(D) none of these

45. $\lim_{x \to \infty} (x)^{1/x} \text{ is equal to}$

(A) e

(B) -1

(D) none of these

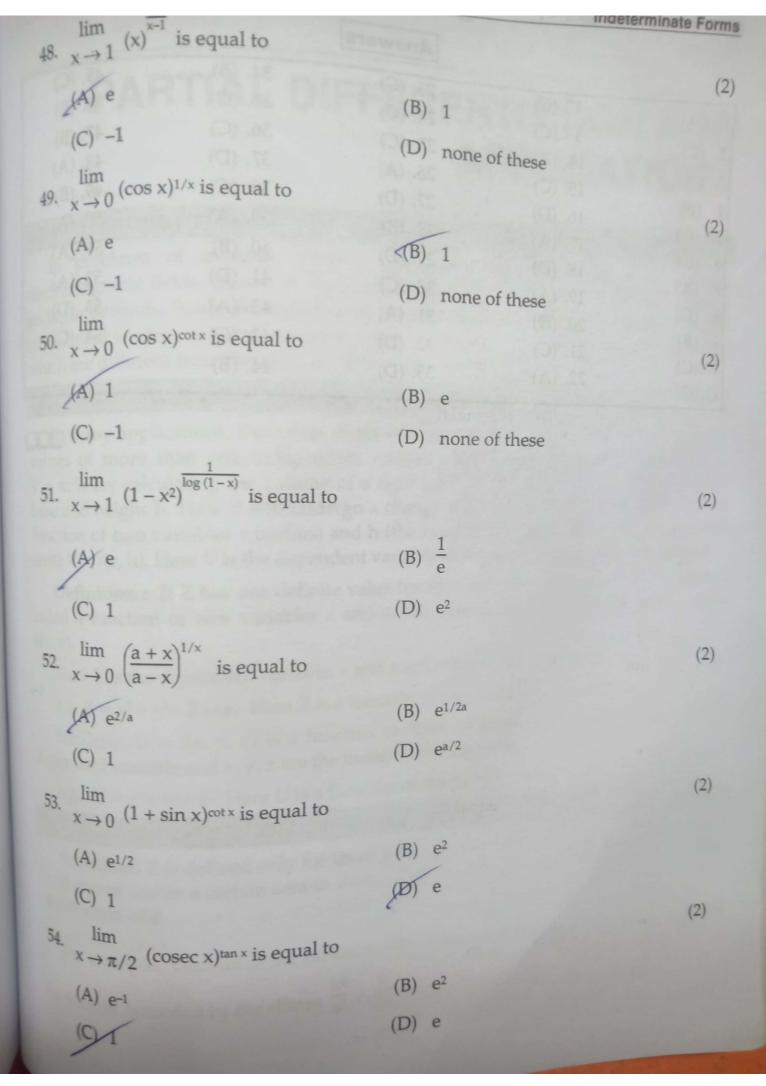
- 46. $\lim_{x \to \pi/2} (\sec x)^{\cot x} \text{ is equal to}$

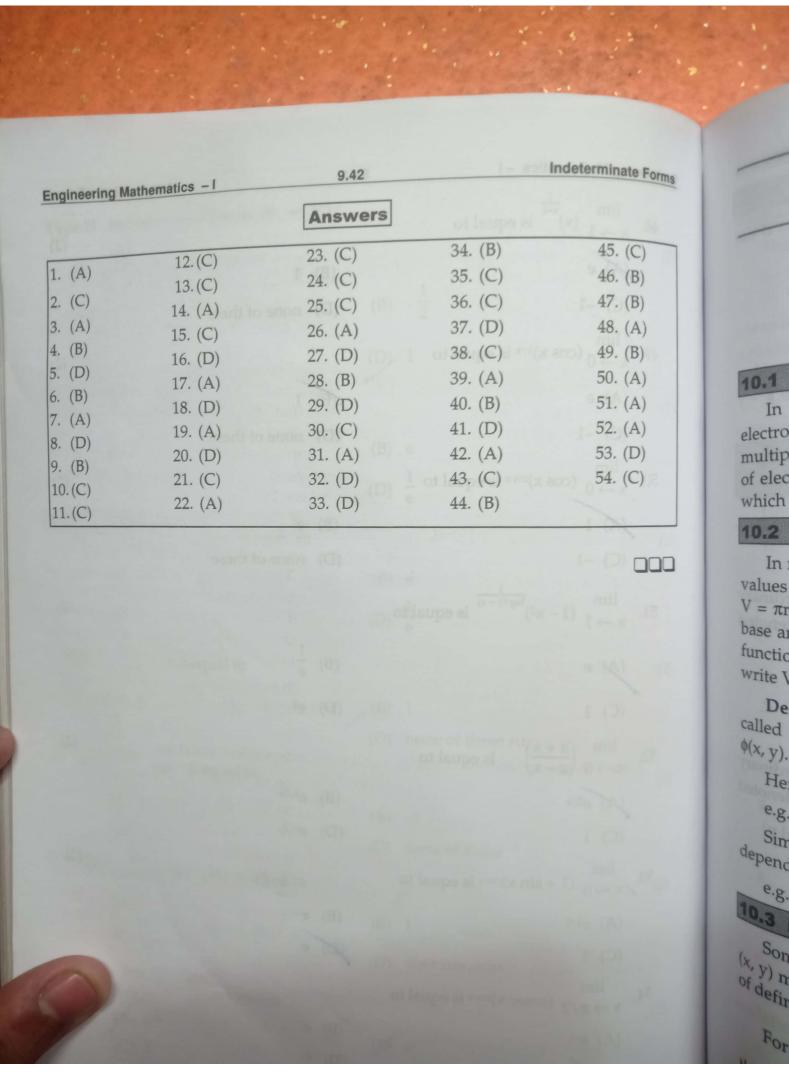
(A) e

(D) does not exist

 $(C) \frac{1}{e}$

- 47. $\lim_{x \to \infty} \left(1 + \frac{a}{x}\right)^x$ is equal to





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