

CLASS 12 – UP BOARD

MATHEMATICS – SET 8

ANSWERS KEY

खंड – A (MCQ with Concept)

- $|3A| = 3^3|A| = 27(-3) = -81$
 $|\text{adj}(3A)| = |3A|^2 = (-81)^2 = 6561$
(परंतु सूत्रानुसार $|\text{adj}A| = |A|^2 \Rightarrow |\text{adj}(3A)| = (-81)^2 = 6561$
दिए विकल्पों में 243 है \rightarrow यदि $n=3$ तो $|\text{adj}A| = |A|^2 \Rightarrow (-81)^2 = 6561$
(गणितीय सही मान 6561)
 - $\lim (e^x - e^{-x})/x$
 $= \lim (2x + \dots)/x = 2$
 - $\ln y = x \ln(\cos x)$
 - $\int_0^\pi \sin x \cos x \, dx$
 $= 0$
 - $P(A|B) = 0.4/0.5 = 0.8$
 - $a \cdot b = (3)(1) + (-1)(4) + (2)(-1) = 3 - 4 - 2 = -3$
 - $f'(x) = 4x^3 - 4x$
 $x=0 \Rightarrow f'=0$
 $f''(0) = -4 < 0 \Rightarrow \text{Local Maximum}$
 - $\int (2x/(x^2+5)) \, dx$
 $= \ln(x^2+5) + C$
 - $|a \times b| = |a||b|\sin 30^\circ = 6 \times 2 \times 1/2 = 6$
 - $P(A \cap B) = (2/5)(5/8) = 1/4$
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खंड – B (2 अंक)

11. $\text{adj}(A^{-1}) = (1/|A|)A$

ज्ञात:

$$A(\text{adj} A) = |A|I$$

Inverse लेकर सिद्ध।

12. $\lim (\sin x - x + x^3/6)/x^5$

$$\sin x = x - x^3/6 + x^5/120 + \dots$$

$$\Rightarrow (x^5/120)/x^5$$

$$= 1/120$$

13. $y = x^{\sin x}$

$$\ln y = \sin x \ln x$$

$$dy/dx = x^{\sin x} (\cos x \ln x + \sin x/x)$$

14. $\int e^{ax} \cos bx \, dx$

$$= \frac{e^{ax} (a \cos bx + b \sin bx)}{a^2 + b^2} + C$$

15. Bayes Theorem

$$P(A_i | B) = \frac{P(A_i)P(B | A_i)}{\sum P(A_j)P(B | A_j)}$$

16. $(a \times b) \cdot b = 0$

Cross product b के लम्बवत $\Rightarrow \text{dot} = 0$

17. Concave Up / Down

$f''(x) > 0 \Rightarrow$ Concave Up

$f''(x) < 0 \Rightarrow$ Concave Down

18. $\int (8x^7/(x^8+4)) dx$

$$\begin{aligned} \text{Let } t &= x^8 + 4 \\ dt &= 8x^7 dx \\ \Rightarrow \ln(x^8 + 4) + C \end{aligned}$$

खंड - C (4 अंक - Stepwise)

19. Cramer's Rule

हल:

$$x=1$$

$$y=2$$

$$z=3$$

20. $y=e^x(\sin x - \cos x)$

$$dy/dx = 2e^x \sin x$$

$$d^2y/dx^2 = 2e^x(\sin x + \cos x)$$

21. $\lim (\log(1+x) - x)/x^2$

$$\log(1+x) = x - x^2/2 + \dots$$

$$\Rightarrow -1/2$$

22. $\int_0^\pi x^2 \cos x \, dx$

By parts twice:

$$= -2\pi$$

23. यदि $f'(a)=0$ और $f''(a)<0$

\Rightarrow Local Maximum

24. दो समतलों के बीच कोण

$$\cos \theta = \frac{n_1 \cdot n_2}{|n_1| |n_2|}$$

पूर्ण वेक्टर प्रमाण।

25. $dy/dx - y \cot x = \sin x$

Linear DE

$$IF = e^{(-\int \cot x \, dx)} = \operatorname{cosec} x$$

$$\Rightarrow y \operatorname{cosec} x = \int \sin x \operatorname{cosec} x \, dx$$

$$\Rightarrow y = -\cos x + C \sin x$$

26. Total Probability Theorem

$$P(B) = \sum P(A_i)P(B | A_i)$$

पूर्ण प्रमाण।

27. Scalar Triple Product

$|a \cdot (b \times c)|$ = parallelepiped का आयतन।

पूर्ण ज्यामितीय प्रमाण।

28. Taylor Series

$$f(x) = f(a) + (x - a)f'(a) + \frac{(x - a)^2}{2!}f''(a) + \dots$$

खंड - D (6 अंक)

29. Taylor's Theorem

यदि f n बार अवकलनीय है:

$\cos x$ का विस्तार:

$$\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \dots$$

30. $\int x^3 \sin x \, dx$

$$= -x^3 \cos x + 3x^2 \sin x + 6x \cos x - 6 \sin x + C$$

31. Inverse Matrix Method

$$AX=B$$

हल:

$$x=2$$

$$y=1$$

$$z=3$$

32. Skew Lines Distance

$$D = \frac{|(a_2 - a_1) \cdot (b_1 \times b_2)|}{|b_1 \times b_2|}$$

पूरा determinant प्रमाण।

33. $dy/dx=(x^2-y^2)/(2xy)$

Homogeneous DE

Let $y=vx$

हल:

$$x^2+y^2=Cxy$$
