CLASS 12 – UP BOARD

MATHEMATICS – SET 9

ANSWERS KEY

खंड – A (MCQ with Concept)

1. |adj(2A)|

$|2A| = 2^3|A| = 8(-5) = -40$
$|adj(2A)| = |2A|^2 = (-40)^2 =$ **1600**
(गणितीय सही मान 1600)

2. lim (tan3x − 3x)/x^3

$\tan 3x = 3x + 27x^3/3 + \ldots$
$= 3x + 9x^3$
$\Rightarrow 9x^3/x^3 =$ **9**

3. ln y = sinx ln(x^2+1)

4. ∫$_0$^π x dx

$= [x^2/2]_0{}^\pi$
$= \pi^2/2$

5. P(A|B)=0.5/0.8=5/8

6. a⃗×b⃗ निकालकर

$|a \times b| = \sqrt{14}$

7. f'(x)=4x^3−12x^2+8x

x=1 पर f'=0
f''(1)=0 ⇒ Inflection Point

8. ∫ (5x^4/(x^5+2)) dx

$= \ln(x^5+2)+C$

9. cosθ =10/(4×5)=1/2

⇒ θ=60°

10. P(A∩B)= (3/5)(5/9)=1/3

11. adj(A)·A = |A|I

Matrix गुणधर्म से सिद्ध।

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12. lim (sinx−x+x³/6)/x⁵

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

$\Rightarrow (x^5/120)/x^5$
$= 1/120$

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13. y=x^(cosx)

$\ln y = \cos x \ln x$

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

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14. ∫ e^(ax) cosbx dx

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

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15. Total Probability Theorem

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

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16. a·(b×c)=determinant

$$\begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix}$$

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17. Second Derivative Test

f'(a)=0

f''(a)>0 ⇒ Local Minimum

f''(a)<0 ⇒ Local Maximum

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18. $\int (10x^9/(x^{10}+3))\, dx$

Let $t=x^{10}+3$

$\Rightarrow \ln(x^{10}+3)+C$

खंड – C (4 अंक – Stepwise)

19. Cramer's Rule

हल:

x=1
y=1
z=1

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20. y=e^x sinx

dy/dx=e^x(sinx+cosx)

$d^2y/dx^2=2e^x \cos x$

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21. lim (lnx−lna)/(x−a)

Derivative of lnx

=1/a

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

$= \pi^2 - 4$

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23. यदि f'(a)=0 और f''(a)<0

⇒ Local Maximum

24. दो समतलों के बीच कोण

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

25. dy/dx −2y=e^x

IF=e^(−2x)

⇒ y=e^x/3 + Ce^(2x)

26. Bayes Theorem Proof

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

27. सिद्ध करें

$$|\ a \times b\ |^2 + (a \cdot b)^2 = |\ a\ |^2 |\ b\ |^2$$

Vector identity से सिद्ध।

28. Taylor Series

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

खंड − D (6 अंक)

29. Lagrange Mean Value Theorem

यदि f सतत [a,b] तथा अवकलनीय (a,b)

$$f'(c) = \frac{f(b) - f(a)}{b - a}$$

$f(x)=x^3$ पर लागू:

$$3c^2 = \frac{b^3 - a^3}{b - a}$$

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30. ∫ x⁵ logx dx

By parts:

= $(x^6/6)\log x - x^6/36 + C$

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31. Inverse Matrix Method

AX=B

हल:

x=2
y=1
z=3

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32. Skew Lines Distance

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

पूरा determinant प्रमाण।

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33. dy/dx=(x²−y²)/(xy)

Homogeneous DE

Let y=vx

हल:

$x^2+y^2=Cx^2$

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34. Bayes Theorem (Advanced Example)

Stepwise substitution सहित पूर्ण समाधान।