# BK BIRLA CENTRE FOR EDUCATION

**SARALA BIRLA GROUP OF SCHOOLS**

**SENIOR Secondary Co-Ed DAY CUM BOYS' RESIDENTIAL SCHOOL**

**PRE BOARD-1- 2024**

**MATHEMATICS (041)**

Class: XII Science | Duration: 3 Hour

Date: 16/11/24 | MARKING SCHEME | Max. Marks: 80

| Q No. | Answer | Scheme |
|---|---|---|
| 1 | **(C)** | **Bijective** |
| 2 | **(B)** | **$5\pi/6$** |
| 3 | **(A)** | $\begin{bmatrix} 1 & na \\ 0 & 1 \end{bmatrix}$ |
| 4 | **(A)** | **0** |
| 5 | **(B)** | **25** |
| 6 | **(C)** | **18** |
| 7 | **(A)** | **-1** |
| 8 | **(C)** | $f(-\frac{1}{2}) = f(-\frac{1}{2})$ |
| 9 | **(B)** | Minimum at x=1 |
| 10 | (B) | $\frac{(logx)^6}{6} + c$ |
| 11 | **(C)** | **9** |
| 12 | **(B)** | 9/2 sq.units |
| 13 | **(B)** | 32/3 |
| 14 | **(D)** | **None of these** |
| 15 | **(B)** | **3,2** |
| 16 | **(A)** | **11/36** |
| 17 | **(A)** | **Coincident** |
| 18 | **(A)** | **0.39** |
| 19 | **(D)** | |
| 20 | **(A)** | |
| 21 | Injectivity: $x^3 + x = y^3 + y \Longrightarrow x=y$<br>Surjectivity: for every $y \varepsilon R$ there exist t $\varepsilon$ R such that f(t) = y. So, f is surjective<br>Hence f is a bijection. | |
| 22 | By right triangle rule of trigonometry, $\sin^{-1} 3/5 = \cos^{-1} 4/5$<br>Therefore value is 4/5<br>OR<br>$\tan^{-1}\sqrt{3} = \pi/6$ | |
| 23 | Increasing $(-\infty, -1)$<br>Decreasing $(-1,\infty)$ | |
| 24 | Let $x^2 + 1$ be t<br>$\int \frac{dt}{t^{3/2}} = -2/\sqrt{x^2+1}$ | |

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| | OR<br>$\int_2^3 -(x-3)dx + \int_3^5 (x-3)dx$ = $-\frac{1}{2}$ |
| 25 | $\left(2\vec{a}+\vec{b}+\vec{c}\right)^2$ = 4x1+1+1<br>$\left(2\vec{a}+\vec{b}+\vec{c}\right)$ = $\sqrt{6}$ |
| 26 | Apply log to both side, ylogx = x log y<br>Differentiating both side w.r.t x<br>$\frac{dy}{dx} = \frac{y(xlogy-y)}{x(ylogx-x)}$ |
| 27 | Let $x^2$ = t , 2xdx = dt<br>$1/2\int \frac{tdt}{t^2+3t+2}$ integrate with the help of partial fraction method<br>$\log\|x^2+2\| - \frac{1}{2}\log\|x^2+2\| + C$<br>OR<br>Apply the identity of $(a\text{-}b)^3$ and integrate<br>$\frac{x^4}{4} + \frac{1}{2x^2} - \frac{3}{2}x^2$+3logx +C |
| 28 | By using variable separable method, we have<br>$\frac{x^2}{2} + x + \log(x-1) + \frac{y^2}{2} + \log(y+1) + C$ |
| 29 | P(X=0) =1/8<br>P(X=1) = 3/8<br>P(X=2) = 3/8<br>P(X=3)= 1/8<br>OR<br>$E_1$ = Six occurs, $E_2$ = six does not occur, A = man reports that its six<br>$P(E_1)$ = 1/6, $P(E_2)$ = 5/6,  P(A/E1) = ¾, P(A/E2) = ¼<br>P(E1/A) = 3/8 |
| 30 | $\left\|\sqrt{3}\,\vec{a} - \vec{b}\right\|^2$ = 1<br>3-2$\sqrt{3}$ $(\vec{a}\,.\,\vec{b})$ +1 =1<br>Cos$\theta$ = $\frac{\sqrt{3}}{2}$ = $\frac{\pi}{6}$ |
| 31 | Shortest distance between two given line  d = $\left\|\frac{(a_2\text{-}a_1)(b1xb2)}{\|b1xb2\|}\right\|$ = 6/$\sqrt{5}$<br>$a_2$-$a_1$ = -3i+2k<br>$b_1$x$b_2$ = 2i –j<br>$\|b_1xb_2\|$ =$\sqrt{5}$ |
| 32 | Reflexivity: ab=ba, (a,b) R (b,a), therefore R is refelixive<br>Symmetry: ad=bc, cb=da, (c,d)R(a,b) , therefore R is symmetric.<br>Transitive: ad=bc and cf=de hence af=be, therefore R is transitive.<br>Since R satisfy all three condition so, its equivalence relation. |
| 33 | $A^{-1}$ = $\begin{bmatrix} 4 & -5 & 1 \\ 2 & 0 & -2 \\ 2 & 5 & 3 \end{bmatrix}$<br>X= 9/5, Y= 2/5, Z= 7/5 |
| 34 | Proper figure<br>$\int_{-2}^{4} \frac{3x+2}{2} - \frac{3}{4}\,x^2\,dx$<br>27sq.unit |

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| | OR<br>Proper figure<br>$2\int_0^{1/2} 2\sqrt{x}\,dx + 2\int_{1/2}^{3/2} \sqrt{\frac{9}{4} - x^2}\,dx$<br>$\frac{\sqrt{2}}{6} + \frac{9\pi}{8} - \frac{9}{4}\, sin^{-1}\frac{1}{3}$ sq. units |
| 35 | Proper graph<br>Corner points (0,0), (2,0), ( 8/5, 6/5), (0,2)<br>Maximum value at (0,2) is 10<br>OR<br>Proper graph<br>(0,0), ( 6,0), (4,3), ( 0, 19/3)<br>Maximum production is 320 at (4,3) |
| 36 | (A) 120 , (B) 180, (C) 300 |
| 37 | (A) $\frac{\pi}{2}(75r - r^3)$<br>(B) -3$\pi$r<br>(C) V is max at r=5cm |
| 38 | (A) 50/3,40/3<br>(B) (0,20), (50/3,40/3) ,(30,0)<br>(C) (30,0) |
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