# INDIAN SCHOOL AL WADI AL KABIR

Unit Test (2023 - 2024)

Class: XI | Sub: MATHEMATICS (041) | Max Marks: 30

Date: 23.05.2023 | SET - 2 | Time: 1 hr

<table>
<tr><td>1</td><td>c) 229° 10’ 59”</td><td>2</td><td>d) 4 : 3</td><td>3</td><td>a) 2</td></tr>
<tr><td>4</td><td>c) $\frac{1}{2}$</td><td>5</td><td>c) 4</td><td>6</td><td>a) {16, 17, 18, ……25}</td></tr>
<tr><td>7</td><td colspan="5">(A) Both A and R are true and R is the correct explanation of A</td></tr>
<tr><td>8</td><td colspan="5">It is given that the number of subsets of a set containing m elements is 112 more than the number of subsets of set containing n elements.<br>$2^m – 2^n = 112$<br>$=2"(2^{m-n} - 1)= 2 x 2 x 2 x \ 2 x 7$<br>$= 2"(2^{m-n} - 1) = 2^4 (2^3 - 1)$<br>n = 4 and m - n = 3<br>.. m – 4 = 3 → m = 7<br>The values of m and n are 7 and 4, respectively.</td></tr>
<tr><td>9</td><td colspan="5">Radius of circle = 2 cm<br>In 60 seconds, angle covered by second hand is 360°<br>In 40 seconds, angle covered by second hand is 360°x $\frac{4}{6}$= 240°<br>Angle=Arc length / Radius<br>Arc length = $\frac{8\pi}{3}$ = 12.56 cm.</td></tr>
<tr><td></td><td colspan="5">- OR –<br>$3x = 2x + x$<br>$\tan 3x = \tan (2x + x)$<br>$\tan 3x = \frac{\tan 2x+\tan x}{1-\tan 2x .\tan x}$<br>$\tan 3x – \tan 3x \tan 2x \tan x = \tan 2x + \tan x$<br>$\tan 3x – \tan 2x – \tan x = \tan 3x \tan 2x \tan x$</td></tr>
<tr><td>10</td><td colspan="5">$\frac{x}{3} + 1 = \frac{5}{3}$ → x = 2,<br>$y - \frac{2}{3} = \frac{1}{3}$ → y = 1</td></tr>
<tr><td>11</td><td colspan="3">$y = \frac{3}{2 - x^2}$<br>$\Rightarrow 2 - x^2 = \frac{3}{y}$<br>$\Rightarrow x^2 = 2 - \frac{3}{y}$<br>But $x^2 \geq 0$ So $2 - \frac{3}{y} \geq 0$</td><td colspan="2">$\Rightarrow \frac{2y-3}{y} \geq 0$<br>⇒ y>0 and 2y≥3<br>⇒ y>0 and $y \geq \frac{3}{2}$<br>range of f = $(-\infty, 0) \cup \left[\frac{3}{2}, \infty\right)$</td></tr>
</table>

| | | |
|---|---|---|
| 12 | $\cos^2\frac{\pi}{8}+\cos^2\frac{3\pi}{8}+\cos^2\frac{5\pi}{8}+\cos^2\frac{7\pi}{8}$<br>$=\frac{1+\cos\frac{2\pi}{8}}{2}+\frac{1+\cos\frac{6\pi}{8}}{2}+\frac{1+\cos\frac{10\pi}{8}}{2}+\frac{1+\cos\frac{14\pi}{8}}{2}$<br>$=\frac{1+\cos\frac{2\pi}{8}}{2}+\frac{1+\cos\left(\pi-\frac{2\pi}{8}\right)}{2}+\frac{1+\cos\left(\pi+\frac{2\pi}{8}\right)}{2}+\frac{1+\cos\left(2\pi-\frac{2\pi}{8}\right)}{2}$<br>$=\frac{1+\cos\frac{2\pi}{8}}{2}+\frac{1-\cos\frac{2\pi}{8}}{2}+\frac{1-\cos\frac{2\pi}{8}}{2}+\frac{1+\cos\frac{2\pi}{8}}{2}$<br>$=2\times\frac{1+\cos\frac{2\pi}{8}}{2}+2\times\frac{1-\cos\frac{2\pi}{8}}{2}=1+\cos\frac{2\pi}{8}+1-\cos\frac{2\pi}{8}$<br>$=2$ | |
| | - OR-<br>$\sqrt{2+\sqrt{2+2\cos4x}}$<br>$=\sqrt{2+\sqrt{2(1+\cos4x)}}$<br>$=\sqrt{2+2\sqrt{\cos^2 2x}}$ | $=\sqrt{2+2\cos2x}$<br>$=2\sqrt{\cos^2 x}$<br>$=2\cos x$ |
| 13 | Let $x=\frac{\pi}{8}$. Then $2x=\frac{\pi}{4}$.<br>$\tan 2x=\frac{2\tan x}{1-\tan^2 x}$<br>$\tan\frac{\pi}{4}=\frac{2\tan\frac{\pi}{8}}{1-\tan^2\frac{\pi}{8}}$<br>Let $y=\tan\frac{\pi}{8}$. Then $1=\frac{2y}{1-y^2}$ | $y^2+2y-1=0$<br>$y=\frac{-2\pm2\sqrt{2}}{2}=-1\pm\sqrt{2}$<br>Since $\frac{\pi}{8}$ lies in the first quadrant, $y=\tan\frac{\pi}{8}$ is positve.<br>$\tan\frac{\pi}{8}=\sqrt{2}-1$. |
| 14 | (i) 8<br>(ii) $D_f = R - \{2, 6\}$<br>(iii) **[-3, 3]** OR $(-\infty, 3] \cup [3, \infty)$ | |
| 15 | (i) (-4, 6]<br>(ii) $A \cup (B \cap C) = \{1, 2, 3, 4, 5, 6\}$<br>(iii) n(S) + n(P) = 11 -OR- $R_f = [0, 1)$ | |