OR

17. $LHS = \left(2\sin\frac{\alpha+\beta}{2} \cdot \sin\frac{\beta-\alpha}{2}\right)^2 + \left(2\cos\frac{\alpha+\beta}{2}\sin\frac{\alpha-\beta}{2}\right)^2$ — 2

$= 4\sin^2\frac{\alpha+\beta}{2}\sin^2\frac{\alpha-\beta}{2} + 4\cos^2\frac{\alpha+\beta}{2}\sin^2\frac{\alpha-\beta}{2}$ — 2

$= 4\sin^2\left(\frac{\alpha-\beta}{2}\right)\left[\sin^2\frac{\alpha+\beta}{2} + \cos^2\frac{\alpha+\beta}{2}\right]$ — 1

$= 4\sin^2\left(\frac{\alpha-\beta}{2}\right)$ — 1

14. $2\sin\left(\frac{m+n}{2}\right)\theta \cos\left(\frac{m-n}{2}\right)\theta = 0$ — 1

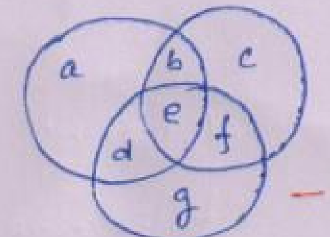
i) $\sin\left(\frac{m+n}{2}\right)\theta = 0$ — $1\frac{1}{2}$

$\theta = \frac{2r\pi}{m+n}$

ii) $\cos\left(\frac{m-n}{2}\right)\theta = 0$

$\left(\frac{m-n}{2}\right)\theta = (2s+1)\frac{\pi}{2}$ — $1\frac{1}{2}$

$\theta = \frac{(2s+1)\pi}{m-n}$

15. 

— 1

$n(M) = a+b+d+e = 15$
$n(P) = b+c+e+f = 12$
$n(C) = d+e+f+g = 11$
$n(M\cap P) = b+e = 9$
$n(P\cap C) = e+f = 4$
$n(M\cap C) = d+e = 5$
$n(M\cap P\cap C) = e = 3$

2

i) only Chemistry $= g = 5$ — 1
ii) only Mathematics $= a = 4$ — 1
iii) only Physics $= c = 2$ — 1

16. Domain $f(x)$ defined when $16-x^2 \geq 0$
$(x-4)(x+4) \leq 0$
$x \in [-4, 4]$ — 3

Range $y = \sqrt{16-x^2}$
$y^2 = 16-x^2$
$x = \sqrt{16-y^2}$
x will take real if $16-y^2 \geq 0$
$(y-4)(y+4) \leq 0$ — 3

Range $= [0, 4]$

17. $LHS = \frac{2\sin 4A \cos 3A + 2\sin 4A \cos A}{2\cos 4A \cos 3A + 2\cos 4A \cos A}$ — 2

$= \frac{2\sin 4A(\cos 3A + \cos A)}{2\cos 4A(\cos 3A + \cos A)}$ — 2

— 2

$= \tan 4A$

MARKING SCHEME PT-1 (2017-18)

CLASS - XI SUBJECT - MATHEMATICS

1. $\{5^n : n \in N, 1 \leq n \leq 4\}$ — 1

2. ϕ , $\{\phi\}$ — 1

3. $\{(1,1,1), (1,1,2), (1,2,1), (1,2,2)\ (2,1,1), (2,1,2), (2,2,1), (2,2,2)\}$ — 1

4. $R = \{2, 4, 6, 8\}$ — 1

5. $(A \cup B)'$ correct — 1
$(A' \cap B)'$ correct — 1

6. Given $A \subset \phi$
and $\phi \subset A$] 1
$\Rightarrow A = \phi$ 1

7. Domain $= \{1, 2, 3, 4\}$ — 1
Range $= \{3, 6, 9, 12\}$ — 1

8. $[f(x)]^3 = \left(x + \frac{1}{x}\right)^3$
$f(x^3) = x^3 + \frac{1}{x^3}$] 1
$3 f\left(\frac{1}{x}\right) = 3\left(\frac{1}{x} + x\right)$
$\therefore f(x^3) + 3f\left(\frac{1}{x}\right) = x^3 + \frac{1}{x^3} + 3\left(x + \frac{1}{x}\right) = \left(x + \frac{1}{x}\right)^3$] 1

9. $60^\circ = \left(\frac{\pi}{3}\right)^c$, $75^\circ = \left(\frac{5\pi}{12}\right)^c$ — 1

$\therefore \frac{\pi}{3} = \frac{x}{r_1}$, $\frac{5\pi}{12} = \frac{x}{r_1}$ $\left(\because \theta = \frac{\text{Arc}}{\text{Radius}}\right)$ - $\frac{1}{2}$

where x is arc and r_1, r_2 are radius

$\frac{r_1}{r_2} = \frac{3x}{\pi} \div \frac{12x}{5\pi} = 5:4$ - $\frac{1}{2}$

10. $\sin\left(-\frac{11\pi}{3}\right) = -\sin\frac{11\pi}{3}$
$= -\sin\left(4\pi - \frac{\pi}{3}\right)$] 1
$= -\left(-\sin\frac{\pi}{3}\right)$] 1
$= \sqrt{3}/2$

11. $n(U) = 200$, $n(C_1) = 120$, $n(C_2) = 50$, $n(C_1 \cap C_2) = 30$

i) $n(C_1 - C_2) = n(C_1) - n(C_1 \cap C_2)$

$= 120 - 30 = 90$ — 2

ii) $n(C_1 \cup C_2) = n(C_1) + n(C_2) - n(C_1 \cap C_2)$

$= 120 + 50 - 30 = 140$ — 2

OR

i) Correct proof — 2 ii) Correct proof — 2

12. Range of 'f'

$$y = \frac{x^2}{1+x^2}$$

$$y(1+x^2) = x^2$$

$$x = \pm\sqrt{\frac{y}{1-y}}$$

— 1

x will take real values if $\frac{y}{1-y} \geq 0$ — 1

$y \geq 0$ and $1-y > 0$ — 1

range $= [0, 1)$ — 1

13. $\cot 3A = \cot(2A + A)$

$\Rightarrow \cot 3A = \dfrac{\cot 2A \cdot \cot A - 1}{\cot 2A + \cot A}$ — 2

$\Rightarrow \cot 3A \cot 2A + \cot 3A \cdot \cot A = \cot 2A \cot A - 1$

$\Rightarrow \cot A \cdot \cot 2A - \cot 2A \cot 3A - \cot 3A \cot A = 1$ — 2

OR

$\tan A - \tan B = \tan(A-B)(1 + \tan A \tan B)$

$\tan 70^\circ - \tan 20^\circ = \tan(70^\circ - 20^\circ)(1 + \tan 70^\circ \tan 20^\circ)$ — 2

$= \tan 50^\circ (1 + \tan 70^\circ \cot 70^\circ)$

$= 2\tan 50^\circ$ — 2

$\Rightarrow \tan 70^\circ = \tan 20^\circ + 2\tan 50^\circ$