	BCM SCHOOL BASANT AVENUE DUGRI ROAD LUDHIANA SUBJECTIVE ASSIGNMENT XISC (MATHS)	M.M:20
1	[Hint: Number of straight lines = ${}^{18}C_2$ - ${}^{5}C_2$ + 1.]	2
2	Show that for any sets A and B, A = (A ∩ B) ∪ (A − B) and A ∪ (B − A) = (A ∪ B) PROVE IT WITH THE HELP OF DISTRIBUTIVE LAW	2
3	Let T be the set of students who like tea and C be the set of students who like coffee. Here n(T) = 150, m (C) = 225 and $n(C \cap T) = 100$ We know that $n(C \cup T) = n(C) + n(T) - n(C \cap T)$ = 150 + 225 - 100 = 275 ∴Number of students taking either tea or coffee += 275 ∴Number of students taking neither tea nor coffee = 600 - 275 = 325	2
4	Given $f(x) = 3x^2 - 5$ For $Df, f(x)$ must be real number $\Rightarrow 3x^2 - 5$ must be a real number Which is a real number for every $x \in R$ $\Rightarrow Df = R$..........(i) $for\ Rf,$ let $y = f(x) = 3x^2 - 5$ We know that for all $x \in R, x^2 \geq 0 \Rightarrow 3x^2 \geq 0$ $\Rightarrow 3x^2 - 5 \geq -5 \Rightarrow y \geq -5 \Rightarrow Rf = [-5, \infty]$ Funthes, as $-3 \in Df, f(-3)$ exists is and $f(-3)$ $= 3(-3)^2 - 5 = 22.$ As $43 \in Rf$ on putting $y = 43$ is (i) weget $3x^2\text{-}5\text{=}43 \Rightarrow 3x^2\text{=}48 \Rightarrow x^2\text{=}16 \Rightarrow x = -4, 4.$ There fore -4 and 4 are number $(\text{is } Df)$ which are associated with the number 43 in Rf	3
5	The alphabetical order of RACHIT is A, C, H, I, R and T Number of words beginning with A = 5! Number of words beginning with C = 5! Number of words beginning with H = 5! Number of words beginning with 1 = 5! and Number of words beginning with R (i.e.) RACHIT = 1 ∴ The rank of the word 'RACHIT' in the dictionary = 5! + 5! + 5! + 5! + 1 = 4 × 5! + 1 = 4 × 5 . 4 . 3 . 2 . 1 + 1 = 4 × 120 + 1 = 480 + 1 = 481	3

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$$a + ib = \frac{c+i}{c-i}$$

$$\Rightarrow \quad a + ib = \frac{(c+i)(c+i)}{(c-i)(c+i)}$$

$$\Rightarrow \quad a + ib = \frac{(c+i)^2}{c^2 - i^2}$$

$$\Rightarrow \quad a + ib = \frac{c^2 + 2ic + i^2}{c^2 + 1}$$

$$\Rightarrow \quad a + ib = \frac{c^2 - 1}{c^2 + 1} + i \cdot \frac{2c}{c^2 + 1}$$

$$\Rightarrow \quad a = \frac{c^2 - 1}{c^2 + 1} \text{ and } b = \frac{2c}{c^2 + 1}$$

$$\Rightarrow \quad a^2 + b^2 = \left(\frac{c^2 - 1}{c^2 + 1}\right)^2 + \frac{4c^2}{(c^2 + 1)^2}$$

$$= \frac{c^4 + 1 - 2c^2 + 4c^2}{(c^2 + 1)^2}$$

$$\Rightarrow \quad a^2 + b^2 = \frac{c^4 + 2c^2 + 1}{(c^2 + 1)^2}$$

$$\Rightarrow \quad a^2 + b^2 = \frac{(c^2 + 1)^2}{(c^2 + 1)^2} \Rightarrow a^2 + b^2 = 1$$

$$\frac{b}{a} = \frac{2c}{c^2 + 1} \Big/ \frac{c^2 - 1}{c^2 + 1}$$

$$= \frac{2c}{c^2 - 1}$$

Hence, $a^2 + b^2 = 1$ and $b/c = 1$ and $b/c = 2c/(c^2 - 1)$

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7	LHS = $\cos\alpha + \cos\beta + \cos\gamma + \cos(\alpha+\beta+\gamma)$ $= (\cos\alpha + \cos\beta) + [\cos\gamma + \cos(\alpha+\beta+\gamma)]$ $= 2\cos(\frac{\alpha+\beta}{2}).\cos(\frac{\alpha-\beta}{2}) + 2\cos(\frac{\gamma+\alpha+\beta+\gamma}{2}).\ \cos(\frac{\gamma-\alpha-\beta-\gamma}{2})$ $[\because\ \cos x + \cos y = 2\cos(\frac{x+y}{2})\cos(\frac{x-y}{2})]$ $= 2\cos(\frac{\alpha+\beta}{2}).\ \cos(\frac{\alpha-\beta}{2}) + 2\cos(\frac{\alpha+\beta+2\gamma}{2}).\ \cos(\frac{\alpha+\beta}{2})$ $[\because\ \cos(-x) = \cos x]$ $= 2\cos\ (\frac{\alpha+\beta}{2})[\cos\ (\frac{\alpha-\beta}{2}) + \cos(\frac{\alpha+\beta+2\gamma}{2})]$ $= 2\cos(\frac{\alpha+\beta}{2})\left[2\cos\left(\frac{\frac{\alpha-\beta}{2}+\frac{\alpha+\beta+2\gamma}{2}}{2}\right).\ \cos\left(\frac{\frac{\alpha-\beta}{2}-\frac{\alpha+\beta+2\gamma}{2}}{2}\right)\right]$ $= 2\cos(\frac{\alpha+\beta}{2})[2\cos(\frac{\alpha+\gamma}{2}).\ \cos(\frac{-\beta-\gamma}{2})]$ $= 2\cos(\frac{\alpha+\beta}{2})[2\cos(\frac{\alpha+\gamma}{2}).\ \cos\{(-\frac{(\beta+\gamma)}{2})\}]$ $= 2\cos(\frac{\alpha+\beta}{2})[2\cos(\frac{\alpha+\gamma}{2}).\ \cos(\frac{\beta+\gamma}{2})]$ $[\because\ \cos(-x) = \cos x]$ $= 4\cos(\frac{\alpha+\beta}{2}).\ \cos(\frac{\beta+\gamma}{2}).\ \cos(\frac{\alpha+\gamma}{2})$	5