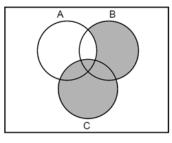1) In a class of 120 students numbered 1 to 120, all even numbered students opt for Physics, whose numbers are divisible by 5 opt for Chemistry and those whose numbers are divisible by 7 opt for Math. How many opt for none of the three subjects?
   (a) 19   (b) 41   (c) 21   (d) 57

2) Two finite sets have N and M elements. The number of elements in the power set of first set is 48 more than the total number of elements in power set of the second test. Then the value of M and N are
   (a) 7, 6   (b) 6, 4   (c) 7, 4   (d) 6, 3

3) The range of the function $f(x) = 3x - 2$, is
   (a) $(-\infty, \infty)$ (b) $R - \{3\}$ (c) $(-\infty, 0)$ (d) $(0, -\infty)$

4) If A, B, C be three sets such that $A \cup B = A \cup C$ and $A \cap B = A \cap C$, then,
   (a) B = C   (b) A = C   (c) A = B = C   (d) A = B

5) Which of the following two sets are equal?
   (a) A = {1, 2} and B = {1}   (b) A = {1, 2} and B = {1, 2, 3}
   (c) A = {1, 2, 3} and B = {2, 1, 3}   (d) A = {1, 2, 4} and B = {1, 2, 3}

6) In a class of 50 students, 10 did not opt for math, 15 did not opt for science and 2 did not opt for either. How many students of the class opted for both math and science.
   (a) 24   (b) 25   (c) 26   (d) 27

7) If A, B and C are any three sets, then $A - (B \cup C)$ is equal to
   (a) $(A - B) \cup (A - C)$ (b) $(A - B) \cup C$
   (c) $(A - B) \cap C$ (d) $(A - B) \cap (A - C)$

8) The shaded region in the given Venn diagram is

(a) $C \cup (A - B)$ (b) $B \cup C$ (c) $C \cup (B - A)$ (d) $(C \cup B) - A$

9) A market research group conducted a survey of 1000 consumers and reported that 720 consumers like product A and 450 consumers like product B, what is the least number that must have liked both products?

(a) 120   (b) 280   (c) 170   (d) 190

10) A relation R is defined from the set of integers to the set of real numbers as $(x, y) = R$ if $x^2 + y^2 = 16$ then the domain of R is

(a) (0, 4, 4)   (b) (0, -4, 4)   (c) (0, -4, -4)   (d) None of these

11) The domain of the function $f(x) = \dfrac{1}{x^2 - 3x + 2}$ is

(a) $\{1, 2\}$ (b) R (c) $R - \{1, 2\}$ (d) $R - \{1, -2\}$

12) Let $A = \{-2, -1, 0\}$ and $f(x) = 2x - 3$ then the range of f is

(a) $\{7, -5, -3\}$ (b) $\{-7, 5, -3\}$ (c) $\{-7, -5, 3\}$ (d) $\{-7, -5, -3\}$

13) If $f(x) = ax + b$, where a and b are integers, $f(-1) = -7$ and $f(3) = -3$, then a and b are equal to

(a) $a = -3, b = -1$ (b) $a = 1, b = -6$ (c) $a = -1, b = -6$ (d) $a = 2, b = 3$

14) If $[x]^2 - 7[x] + 12 = 0$, where [.] denote the greatest integer function, then

(a) $x \in [3,5]$ (b) $x \in (3, 4]$ (c) $x \in [3, 4]$ (d) $x \in [3, 5)$

15) If $f(2x + 3y, 2x - 3y) = 24xy$, then $f(x, y)$ is

(a) $2xy$ (b) $2(x^2 - y^2)$ (c) $(x^2 - y^2)$ (d) $24xy$

16) The domain of the function $f(x) = \dfrac{1}{\sqrt{|x| - x}}$

    (a) $(-\infty, \infty)$ (b) $(0, \infty)$ (c) $(-\infty, 0)$ (d) $(-\infty, \infty) - \{0\}$

17) Domain of $\sqrt{5^2 - x^2}$ is

    (a) $(-5, 5)$ (b) $[-5, 5]$ (c) $(-\infty, 0)$ (d) $(-\infty, \infty) - \{0\}$

18) The value of $\sqrt{(-25)} + 3\sqrt{(-4)} + 2\sqrt{(-9)}$ is

    (a) $13i$ (b) $-13i$ (c) $17i$ (d) $-17i$

19) The least value of n for which $\left(\dfrac{1+i}{1-i}\right)^n$ is real, is

    (a) 2 (b) -1 (c) 8 (d) 4

20) If $Z = \dfrac{5 + \sqrt{2}\,i}{1 - \sqrt{2}\,i}$, then Re Z is

    (a) 1 (b) -1 (c) 2 (d) -2

21) $(1 - i)^4$ is equal to

    (a) 2 (b) -1 (c) 8 (d) -4

22) Solutions of the quadratic equation $x^2 + \dfrac{x}{\sqrt{2}} + 1 = 0$ are

    (a) $\dfrac{1 \mp \sqrt{7}i}{2\sqrt{2}}$ (b) $\dfrac{-1 \mp \sqrt{7}i}{2\sqrt{2}}$ (c) $\dfrac{-1 \mp \sqrt{7}i}{\sqrt{2}}$ (d) $\dfrac{-1 \mp \sqrt{7}i}{2}$

23) If $x + iy = \dfrac{a + ib}{a - ib}$, then $x^2 + y^2$ is

    (a) 2 (b) -1 (c) 1 (d) -4

24) If $a + ib = \left[i^{18} + \left(\dfrac{1}{i}\right)^{25}\right]^3$, then the values of a and b are

    (a) $2, -1$ (b) $-1, 2$ (c) $2, -2$ (d) $1, -2$

25) If $Z = 2 - i$, then Im $\left(\dfrac{1}{z\bar{z}}\right)$ is

    (a) 2 (b) -1 (c) 1 (d) 0

26) If α and β are different complex numbers with $|\beta| = 1$, then $\left|\dfrac{\beta - \alpha}{1 - \bar{\alpha}\,\beta}\right|$ is

    (a) 2   (b) -1   (c) 1   (d) 0

27) For a positive integer n, the value of $(1 + i)^n \left(1 - \dfrac{1}{i}\right)^n$ is

    (a) 2^n (b) 2   (c) i   (d) 0

28) A man saved Rs. 66000 in 20 years. In each succeeding year after the first year, he saved Rs. 200 more than what he saved in the previous year, then the amount he saved in the first year is

    (a)1100   (b) 1200   (c) 1300   (d) 1400

29) A carpenter was hired to build 192 window frames. The first day he made five frames and each day, thereafter he made two more frames than he made the day before, then the total number days he took to finish the job is

    (a)11   (b) 12   (c) 13   (d) 14

30) 1f the sum of p terms of an AP is q and the sum of q terms is p, then the sum of p + q terms is

    (a) (P + q)   (b) -(P + q)   (c) 0   (d) pq

31) If the pth, q^{th} and r^{th} terms of a G.P. are a, b and c, respectively, then $a^{(q-r)}\, b^{(r-p)} c^{(P-q)}$ is

    (a) 2   (b) -1   (c) 1   (d) 0

32) If the sum of n terms of an A.P. is given by $S_n = 3n + 2n^2$, then the common difference of the A.P. is

    (a) 2   (b) 3   (c) 4   (d) 5

33) If the third term of G.P. is 4, then the product of its first 5 terms is

    (a) 4^3 (b)4^4 (c)4^5 (d) None of these

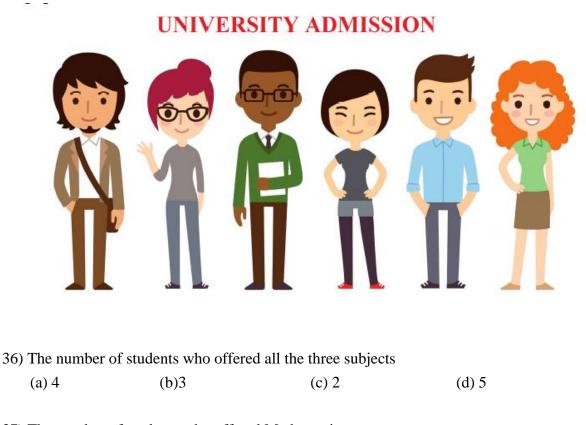
34) If 9 times the 9th term of an A.P. is equal to 13 times the 13th term, then the 22nd term of the A.P. is

    (a) 0   (b)22   (c) 128   (d) 192

35) If in an A.P., $S_n = qn^2$ and $S_m = qm^2$, where S_r denotes the sum of r terms of the AP, then S_q equals

    (a) q^2 (b) q^3 (c) mpq   (d) (m+n) q^2

CASE STUDY QUESTION

In a University, out of 100 students 15 offered Mathematics only; 12 offered statistics only; 8 offered only physics; 40 offered Physics and Mathematics; 20 offered Physics and statistics; 10 offered Mathematics and Statistics; 65 offered Physics. Based on the above information answer the following questions

36) The number of students who offered all the three subjects

   (a) 4   (b)3   (c) 2   (d) 5

37) The number of students who offered Mathematics

   (a) 62   (b) 65   (c) 55   (d) 60

38) The number of students who offered Staistics

   (a) 31   (b) 35   (c) 39   (d) 34

39) The number of students who offered Mathematics and Statistics but not Physics

   (a) 7   (b) 6   (c) 5   (d) 4

40) The number of students who did not offer any of the above three subjects

   (a) 4   (b) 1   (c) 5   (d) 3

<u>Answers</u>

1) (b) 41   2) (b) 6, 4   3) (a) (- ∞, ∞)   4) (a) B = C

5) (c) A = {1, 2, 3} and B = {2, 1, 3}   6) (d) 27   7) (d) (A – B) ∩ (A – C)

8) (c) C ∪ (B – A)   9) (c) 170   10) (b) (0, -4, 4)   11) (c) R – {1, 2}

12) (d) {-7, -5, -3}   13) (b) a = 1, b = -6   A   14) (d) x ∈ [3, 5)   15 (c) $(x^2 – y^2)$

16) (c) (-∞, 0)   17) (b) [-5, 5]   18) (c) 17i   19 (a) 2

20) (a) 1   21) (d) -4   22) (b) $\dfrac{-1 \mp \sqrt{7}i}{2\sqrt{2}}$ 23) (c) 1

24) (c) 2, -2   25) (d) 0   26) (c) 1   27) (a) 2^n

28) (d) 1400   29) (b) 12   30) (b) -(P + q)   31) (c) 1

32) (c) 4   33) (c)4^5 34) (a) 0   35) (b) q^3

36) (b)3   37) (a) 62   38) (c) 39   39) (a) 7

40) (b) 1