DELHI PUBLIC SCHOOL, JAMMU
Assignment for Final Examination (2018-19)

Sub: Maths
Class: XI

Q1. In a town of 10,000 families it was found that 40% families buy newspaper A, 20% families buy newspaper B and 10% families buy newspaper C. 5% families buy A and B, 3% buy B and C and 4% buy A and C. If 2% families buy all the three newspapers, find the number of families which buy (i) A only (ii) B only (iii) none of A, B and C.

Q2. For any two sets A and B prove that $P(A) \cup P(B) \subset P(A \cup B)$ But, P (A ∪ B) is not necessarily a subset of $P(A) \cup P(B)$.

Q3. Prove that $\cos 2x \cos\frac{x}{2} - \cos 3x \cos\frac{9x}{2} = \sin 5x \sin\frac{5x}{2}$.

Q4. Find the general solution of the following equations:

$\cos 3x + \cos x - \cos 2x = 0$

Q5. Prove the that

$$\cos\left(\frac{3\pi}{2} + x\right) \cos(2\pi + x)\left[\cot\left(\frac{3\pi}{2} - x\right) + \cot(2\pi + x)\right] = 1$$

Q6. Find the multiplicative inverse 4 – 3i

Q7. Let $z_1 = 2 - 3i$, $z_2 = -2 + 3i$. Find.

(i) $\text{Re}\left(\frac{z_1 z_2}{z_1}\right)$ (ii) $\text{Im}\left(\frac{1}{z_1 z_2}\right)$

Q8. Find $(x + 1)^6 + (x - 1)^6$. Hence or otherwise evaluate $\left(\sqrt{2} + 1\right)^6 - \left(\sqrt{2} - 1\right)^6$.

Q9. Show that $9^{n+1} - 8n - 9$ is divisible by 64, whenever n is a positive integer.

Q10. The coefficients of the $(r - 1)^{th}$, r^{th} and $(r + 1)^{th}$ terms in the expansion of $(x + 1)^n$ are in the ratio 1:3:5. Find n and r.

Q11. How many words, with or without meaning, each of 2 vowels and 3 consonants can be formed from the letters of the word DAUGHTER?

Q12. How many 6-digit numbers can be formed from the digits, 0, 1, 3, 5, 7 and 9 which are divisible by 10 and no digit is repeated?

Q13. Find the number of arrangements of the letters of the word INDEPENDENCE. In how many of these arrangements.

i. do the words start with P

ii. do all the vowels always occur together

iii. do the vowels never occur together

iv. do the words begin with I and end in P?

Q14. Prove the following by using the principle of mathematical induction for all $n \in N$:

$10^{2n-1} + 1$ is divisible by 11.

Q15. Solve the following system of inequalities graphically?

$4x + 3y \leq 60, y \geq 2x, x \geq 3, x, y \geq 0$

Q16. How many litres of water will have to be added to 1125 litres of the 45% solution of acid so that the resulting mixture will contain more than 25% but less than 30% acid content?

Q17. If the sum of n terms of an A.P. is $3n^2 + 5n$ and its mth term is 164, find the value of m.

Q18. In an A.P., if p^{th} term is $\frac{1}{q}$ and qth term is $\frac{1}{p}$, prove that the sum of first pq terms is $\frac{1}{2}(pq + 1)$, where $p \neq q$.

Q19. Find the sum of the first n terms of the series: $3 + 7 + 13 + 21 + 31 + ...$

Q20. Three coins are tossed once. Find the probability of getting

(i) 3 heads   (ii) 2 heads   (iii) atleast 2 heads

(iv) atmost 2 heads   (v) no head   (vi) 3 tails

(vi) exactly two tails (viii) no tail   (ix) atmost two tails

Q21. A and B are two events such that P(A) = 0.54, P(B) = 0.69 and P(A ∩ B) = 0.35. Find
(i) P(A ∪ B) (ii) P(A′ ∩ B′) (iii) P(A ∩ B′) (iv) P(B ∩ A′)

Q22. Find the equation of the circle passing through (0, 0) and making intercepts a and b on the coordinate axes.

Q23. The cable of a uniformly loaded suspension bridge hangs in the form of a parabola. The roadway which is horizontal and 100 m long is supported by vertical wires attached to the cable, the longest wire being 30 m and the shortest being 6 m. Find the length of a supporting wire attached to the roadway 18 m from the middle.

Q24. Point R(h, k) divides a line segment between the axes in the ratio 1:2. Find equation of the line.

Q25. Calculate the mean deviation about median age for the age distribution of 100 persons given below:

Age	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55
Number	5	6	12	14	26	12	16	9

Q26. The sum and sum of squares corresponding to length x (in cm) and weight y (in gm) .of 50 plant products are given below:

$$\sum_{i=1}^{50} x_i = 212, \ \sum_{i=1}^{50} x_i^2 = 902.8, \ \sum_{i=1}^{50} y_i = 261, \ \sum_{i=1}^{50} y_i^2 = 1457.6$$

Which is more varying, the length or weight?

Q27. A person standing at the junction (crossing) of two straight paths represented by the equations $2x - 3y + 4 = 0$ and $3x + 4y - 5 = 0$ wants to reach the path whose equation is $6x - 7y + 8 = 0$ in the least time. Find equation of the path that he should follow.

Q28. Using section formula, show that the points A(2, -3, 4), B(-1, 2, 1) and $C\left(0, \frac{1}{3}, 2\right)$ are collinear.

Q29. If the origin is the centroid of the triangle PQR with vertices P(2a, 2, 6), Q(-4, 3b, -10) and R(8, 14, 2c), then find the values of a, b and c.

Q30. If a, b, c are in G.P. and $\frac{1}{a^x} = \frac{1}{b^y} = \frac{1}{c^z}$, prove that x, y, z are in A.P.