Final Paper (15 March 2017)
Class XI
Paper- MATHEMATICS
(Set-B)

Time: 3hrs.   M.M. 100

Note: Attempt all questions.
1. Q1 to Q4 carry 1 mark each.
2. Q5 to Q 12 carry 2 marks each
3. Q13 to Q23 carry 4 marks each.
4. Q24 to Q29 carry 6 marks each.

SECTION - A

Question number 1 to 4 carry 1 mark each.

Q1. Find domain and range of following function $f(x) = |x|$

Q2. Find the degree measure corresponding to radian measure of $\dfrac{11}{16}$

Q3. If $\dfrac{1}{8!} + \dfrac{1}{9!} = \dfrac{x}{10!}$ find x.

Q4. If $\dfrac{2}{9}$ is probability of an event 'A', what is probability of event 'not A'.

SECTION – B

Question number 5 to 12 carry 2 marks each.

Q5. If $A = \{2, 4, 6\}$ write power set of A.

Q6. Find general solution for the following equation: $\cos 3x + \cos x - \cos 2x = 0$

Q7. Express the following in form $a + ib$.

$(1 - i)^4$

Q8. Solve $3x + 8 > 2$ when (i) x is an integer   (ii) x is real number

Q9. How many words, with or without meaning, can be formed using all letters of word MONDAY assuming that no letter is repeated if

   i)   4 letters are used at a time

   ii)   all letters are used at a time

Q10. Find equation of line passing through the points (-1, 1) and (2, -4).

Q11. Using section formula, show that the points A (2, -3, 4), B (-1, 2, 1) and $C\left(0, \dfrac{1}{3}, 2\right)$ are collinear.

Q12. A die has two faces each with number '1', three faces each with number '2' and one face with number 3, If die is rolled once find the probability of the following events:

   i)   P (2)   ii) P (1 or 3)

SECTION – C

Question number 13 to 23 carry 4 marks each

Q13. Let $A = \{1, 2, 3, 4, 5, 6\}$. Define a relation R from A to A by $R = \{(x, y) : y = x + 1\}$

    i)   Depict this relation using an arrow diagram

    ii)   Write down the domain, codomain and range of R

Q14. Prove that $\left(Cos\, x - Cos\, y \right)^2 + \left(Sin\, x - Sin\, y \right)^2 = 4\, Sin^2 \left(\dfrac{x - y}{2} \right)$

Q15. If $a + ib = \dfrac{(x + i)^2}{2x^2 + 1}$ then show that $a^2 + b^2 = \dfrac{(x^2 + 1)^2}{(2x^2 + 1)^2}$

Q16. Find the number of arrangements of letters of the word INDEPENDENCE. In how many ways following arrangements can be done using letters of the word Independence :

    i)   do the words start with P.

    ii)   do all the vowels always occur together.

    iii)   Do the words being with I and end in P?

Q17. Find the value of $'n'$ so that $\dfrac{a^{n+1} + b^{n+1}}{a^n + b^n}$ is G.M between 'a' and 'b' then find value of 'n'.

Q18. Find the sum of the sequence 5, 55, 555, 5555, …………….. to n terms.

Q19. Find the equation of lines, which cut-off intercepts on the axes whose sum and product are 1 and -6 respectively.

Q20. Evaluate $\underset{x \to 0}{Lt} \left[\dfrac{x - 2}{x^2 - x} - \dfrac{1}{x^3 - 3x^2 + 2x} \right]$

Q21. Find derivative of $'Cos\, x'$ using first Principle method.

Q22. Rewrite the following statement with "If-then" in four different ways. "If number is multiple of 9, then it is a multiple of 3."

Q23. One card is drawn from a well shuffled deck of 52 cards. If each outcome is equally likely to occur, calculate the probability that card will be :

    i)   a diamond

    ii)   not an ace

    iii)   not a black card

    iv)   a red card

SECTION – D

Question number 24 to 29 carry 6 marks each

Q24. A college warded 38 medals in football, 15 in basketball and 20 in cricket. If these medals went to a total of 58 men and only three men got medals in all the three sports, how many received medals in exactly two of three sports?

Q25. Prove the following by using principle of mathematical induction $V\ n \in N$

$$\frac{1}{1.4} + \frac{1}{4.7} + \frac{1}{7.10} + \text{.........} + \frac{1}{(3n-2)(3n+1)} = \frac{n}{(3n+1)}$$

Q26. Solve the following system of inequalities graphically

$$x - 2y \leq 3$$
$$3x + 4y \geq 12$$
$$x \geq 0 \qquad , y \geq 1$$

Q27. The coefficients $(r-1)^{th}$, r^{th} and $(r+1)^{th}$ terms in expansion of $(x+1)^n$ are in ratio 1: 3: 5.

Find n and r.

Q28. Find, the co-ordinates of the foci, vertices, the length of major axis and minor axis, the eccentricity and length of the latus rectum of the ellipse $36x^2 + 4y^2 = 144$

Q29. Calculate the mean, variance and standard deviation for the following data:

Class	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequencies	3	7	12	15	8	3	2