Final Examination in **MATHEMATICS – Std. 11** M. Marks : 100
25-2-2016 Time : 3 hrs.

Roll N | | |

Total printed pages : 02
Total printed questions : 26

GENERAL INSTRUCTIONS:
i) Attempt all the questions.
ii) Section - A consists of 6 questions of 1 mark each.
iii) Section - B consists of 13 questions of 4 marks each.
iv) Section - C consists of 7 questions of 6 marks each.

SECTION – A

1. Let U = {1, 2, 3, 4, 5, 6}, A = {2, 3}, B = {3, 4, 5} find $A' \cap B'$.

2. If P = {1, 2}, form the set P x P x P.

3. Write the equation of the line for which $\tan\theta = 1/2$, where θ is the inclination of the line and y-intercept is –3/2.

4. Find focus and directrix of the parabola $x^2 = -18y$.

5. Find coordinates of point which divides the line segment joining the points (1, –2, 3) and (3, 4, –5) in ratio 2:3 externally.

6. Events E and F are such that P(not E or not F) = 0.25. State whether E and F are mutually exclusive?

SECTION – B

7. Let A = {1, 2, 3, 4, 5, 6}. Define a relation R from A to A by R = {(x, y) : y = x + 1}
   i) Write down the domain, codomain and range of R.
   ii) Depict this relation using an arrow diagram.

8. Out of 100 students two sections of 40 and 60 are formed. If you and your friend are among the 100 students, what is the probability that
   i) you both enter the same section?
   ii) you both enter the different sections?

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

(OR)

Find the middle term in the expansion of $(1 - 2x + x^2)^n$.

10. Find equation of the line passing through the point of intersection of the lines $4x + 7y - 3 = 0$ and $2x - 3y + 1 = 0$ that has equal intercepts on the axes.

(OR)

Find the value of 'p' so that the three lines $3x + y - 2 = 0$, $px + 2y - 3 = 0$ and $2x - y - 3 = 0$ may intersect at one point.

11. Find the image of the point (3, 8) with respect to line $x + 3y = 7$ assuming the line to be a plane mirror.

12. Find the equation of circle passing through the point (2, 3) and (–1, 1) and whose center is on line $x - 3y - 11 = 0$.

13. Find equation of hyperbola whose foci are (0, 13) and (0, –13) and the conjugate axes is of length 24.

14. Find the coordinate of foci, the vertices, the eccentricity and the length of latus rectum of conic $4x^2 + 9y^2 = 36$.

15. Find the coordinates of the points which trisect the line segment joining the points P(4, 2, –6) and Q(10, –16, 6).

16. Evaluate: $\lim_{x\to 0} \frac{\tan x - \sin x}{x^3}$ (OR) $\lim_{x\to 0} \frac{1-\cos x\sqrt{\cos 2x}}{x^2}$

17. Let f be a function defined as $f(x) = \begin{cases} \frac{5x}{|x| - 2x^2} & , x \neq 0 \end{cases}$. Does $\lim_{x\to 0} f(x)$ *exist*?

18. If $y = \frac{x}{x+a}$, *prove that* $x\frac{dy}{dx} = y(1-y)$.

19. In *any* ΔABC *provethat* $\frac{b^2-c^2}{a^2}\sin 2A + \frac{c^2-a^2}{b^2}\sin 2B + \frac{a^2-b^2}{c^2}\sin 2C = 0$.

(OR)

In ΔABC *prove that*

$$\frac{a^2\sin(B-C)}{\sin B + \sin C} + \frac{b^2\sin(C-A)}{\sin C + \sin A} + \frac{c^2\sin(A-B)}{\sin A + \sin B} = 0$$

SECTION – C

20. Differentiate $\tan^2 2x$ w.r.t x using first principle.

(OR)

Differentiate $\frac{\sin x}{x}$ w.r.t x using first principle.

21. There are 240 students in class XI of a school; 130 play cricket, 100 play football, 75 play volleyball, 30 of these play cricket and football, 25 play volleyball and cricket, 15 play football
and volleyball. Also each student plays at least one of three games. Using venn diagram
find how many students play all the three games.

22. Find the coefficient of x^5 in the product $(1 + 2x)^6 (1 – x)^7$ using binomial theorem.

23. The vertex of an equilateral triangle is (2, 3) and the equation of the opposite side is $\sqrt{3}x + y = 2$. Find the equations of the other two sides.

OR

Prove that the product of the lengths of the perpendiculars drawn from the points $(\sqrt{a^2 - b^2}, 0)$ *and* $(-\sqrt{a^2 - b^2}, 0)$ *to the line* $bx\cos\theta + ay\sin\theta = ab$ *is* b^2.

24. Solve graphically : $x + 2y \leq 10$, $x + y \geq 1$, $x – y \leq 0$, $x \geq 0$, $y \geq 0$.

25. Two students Anil and Ashima appeared in an examination. The probability that Anil will
qualify the examination is 0.05 and that Ashima will qualify the examination is 0.10. The probability that both will qualify the examination is 0.02.
Find the probability that
    a) Both Anil & Ashima will not qualify the examination.
    b) At least one of them will not qualify the examination.
    c) Only one of them will qualify the examination.

26. Find the mean, variance and standard deviation of following data:

Class	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	3	4	7	7	15	9	6	6	3

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