Final Examination in **MATHEMATICS**
Std. 11

M. Marks : 100

28-2-2017

Time : 3 hrs.

Roll No:

Total printed pages   :   03
Total printed questions :   29

GENERAL INSTRUCTIONS:
i)   All the questions are compulsory.
ii)   Section A contains 4 questions of 1 mark each.
iii) Section B contains 8 questions of 2 marks each.
iv)   Section C contains 11 questions of 4 marks each.
v)   Section D contains 6 questions of 6 marks each.

SECTION – A

1.   Find the value of ${}^5C_0 + {}^5C_1 + {}^5C_2 + {}^5C_3 + {}^5C_4 + {}^5C_5$.

2.   The end points of the diameter of a circle are (2, −1) and (0, 5) find the length of the radius of the circle.

3.   What is the probability of a sure event?

4.   Find $\dfrac{dy}{dx}$ where $y = \sin(\sqrt{x^2 + 9})$.

SECTION – B

5.   In $\triangle ABC$, a = 6, b = 2, c = 4, find the value of 4cosA + 3cosB.

6.   Find the angle between the x-axis and the line joining the points (3, −1) and (4, −2).

7.   Find the equation of parabola with focus at (0, −3) and directrix y = 3.

8.   Find $\dfrac{dy}{dx}$ if $y = \dfrac{x^5 - \cos x}{\sin x}$.

9.   Evaluate $\lim\limits_{x \to 0} \dfrac{(x+1)^5 - 1}{x}$

10.   If E and F are events such that $P(E) = \dfrac{1}{4}$, $P(F) = \dfrac{1}{2}$ and $P(E \cap F) = \dfrac{1}{8}$, find P

 (not E and not F).

11. Let A = {1, 2}, B = {1, 2, 3, 4}, C = {5, 6} find $(A \times B) \cap (A \times C)$.

12. If origin is the centroid of $\triangle PQR$ with vertices (2a, 2, 6), Q(−4, 3b, −10) and R(8, 14, 4) then find the values of a and b.

SECTION – C

13. Find the co-ordinates of foot of perpendicular from the point (−1, 3) to the line $3x - 4y - 16 = 0$.

14. Find the equation of circle concentric with circle $2x^2 + 2y^2 - 8x - 12y - 9 = 0$ and passing through the center of the circle $x^2 + y^2 + 8x + 10y - 7 = 0$.

15. Find the co-ordinates of foci, vertices, equation of major axis, equation of latus rectum, length of latus rectum, length of minor axis and latus rectum, eccentricity and distance between foci of the curve $16x^2 + y^2 = 16$.

16. Find the domain and range of real function $f(x) = \sqrt{9 - x^2}$.

17. The vertices of a parallelogram ABCD are A(3, −1, 2), B(1, 2, −4) and C(−1, 1, 2). Find the co-ordinates of the fourth vertex.

18. If $y = \sqrt{\dfrac{1-x}{1+x}}$ then prove $(1 - x^2)\dfrac{dy}{dx} + y = 0$.

19. Suppose $f(x) = \begin{cases} a + bx, & x < 1 \\ 4 & x = 1 \\ b - ax, & x > 1 \end{cases}$ and if $\lim\limits_{x \to 1} f(x) = f(1)$. Find a and b.

(OR)

Evaluate $\lim\limits_{x \to \pi/6} \dfrac{2 - \sqrt{3}\cos x - \sin x}{(6x - \pi)^2}$.

20. Find the probability that when a hand of 7 cards is drawn from a well shuffled deck of 52 cards it contains:
    a) All kings   b) Atleast three kings.

(OR)

If 4 digit number greater than or equal to 5000are randomly formed from the digits 0, 1, 3, 5 and 7, what is the probability of forming a number divisible by 5 when
    a) the digits are repeated   b) the repetition of digits are not allowed.

21. If Universal set U = {1, 2, 3, 4, 5, 6, 7, 8, 9} A = {x: x is an even number and x ≤ 8}, B = {y: y is a prime number and y < 9}.
    Then show that:

a) $(A \cup B)' = A' \cap B'$ b) $(A \cap B)' = A' \cup B'$.

22.   For any $\triangle ABC$, prove that $a(\cos C - \cos B) = 2(b - c)\cos^2 A/2$.

(OR)

In $\triangle ABC$, prove that $(b^2 - c^2)\cot A + (c^2 - a^2)\cot B + (a^2 - b^2)\cot C = 0$.

23.   Show that the coefficients of the middle term in the expansion of $(1 + x)^{2n}$ is equal to the sum
of the coefficients of two middle terms in the expansion of $(1 + x)^{2n-1}$.

SECTION – D

24.   Find the derivative of $f(x) = x\sin x$ using I^{st} principle.

(OR)

Find the derivative of $f(x) = \dfrac{2x+3}{x-2}$ using I^{st} principle.

25.   Find the mean, variance and standard deviation for the given frequency distribution.

Classes:	0 – 30	30 – 60	60 – 90	90 – 120	120 – 150	150 – 180	180 – 210
Frequencies:	2	3	5	10	3	5	2

26.   Find the equation of line passing through the point of intersection of the lines $2x - 3y + 5 = 0$
and $x - y + 1 = 0$ and whose distance from the point (3, 2) is 7/5.

(OR)

A line is such that its segment between the lines $5x - y + 4 = 0$ and $3x + 4y - 4 = 0$ is bisected
at the point (1, 5). Obtain its equation.

27.   Solve the following system of inequations graphically $x - 2y \le 3$, $3x + 4y \ge 12$, $x \ge 0$, $y \ge 1$.

28.   Find a, b and n in the expansion of $(a + b)^n$ if the first three terms of the expansion are
729, 7290 and 30375 respectively.

(OR)

The sum of the coefficients of first three terms in the expansion of $(x - \dfrac{3}{x^2})^m$, $x \ne 0$, $m \in N$

is 559. Find the term of the expansion containing x^3.

29.   In a survey of 60 people, it was found that 25 people read newspaper H, 26 read newspaper T,
26 read newspaper I, 9 read both H and I, 11 read both H and T, 8 read both T and I, 3 read
all three newspaper. Find:

a)   The number of people who read atleast one of the newspaper.
b)   The number of people who read exactly one newspaper.
c)   The number of people who read at the most 2 newspaper.
d)   Write one important role of newspapers in our lives.

-x-x-x-x-x-x-