

CBSE Maths Sample Paper for Class 12

Time : 3 Hours Max.

Marks : 100

General Instructions to be followed by the students:

- 1) All questions are compulsory.
- 2) The question paper consist of 29 questions divided into three sections A, B and C. Section A comprises of 10 questions of one mark each, section B comprises of 12 questions of four marks each and section C comprises of 7 questions of six marks each.
- 3) All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.
- 4) There is no overall choice. However, Internal choice has been provided in 04 questions of four marks each and 02 questions of six marks each. You have to attempt only one of the alternatives in all such questions.
- 5) Use of calculators is not permitted. You may ask for logarithmic tables, if required.

SECTION - A

- 1).Solve the following - $(1+x^2)dy/dx - 2xy = (x^2+2)(x^2+1)$ [1 Mark]
 - 2).Bag A contains 3 white and 2 black balls and bag B contains 2 white and 4 black balls .A ball is drawn from one of the two bags .What is the probability that it is a white ball ? [1 Mark]
 - 3).A speaks the truth in 60% cases and B in 70% cases .In what per cent cases are likely to contradict each other in stating the same fact ? [1 Mark]
 - 4).Evaluate $\int dx / (2x^2 + x + 1)$ [1 Mark]
 - 5).Solve the differential equation : $(x+y)^2 dy/dx = a^2$ [1 Mark]
 - 6).Find the area enclosed between the curves $y=\sin x$ and $y=\cos x$ that lies between the lines $x=0$ and $x=\pi/2$ [1 Mark]
- OR
- Find the area bounded by the curve $y=2x-x^2$ and the line $y=-x$
- 7) Use Lagrange's Mean Value Theorem to find a point P on the curve $y=\sqrt{x-2}$ defined in the interval [2, 3], where the tangent is parallel to the chord joining the end points of the curve. [1 Mark]
 - 8).Evaluate $\int \log|\sin x| dx$. where upper limit - $\pi/2$ and lower limit - 0 [1 Mark]
 - 9).If $y= (ax-b)/ ((x-1)(x-4))$ has turning point P(2,-1) , find the values of a and b , and show that y is maximum at P. [1 Mark]
 - 10).Show that the semi vertical angle of cone of maximum volume and of given slant height is $\tan^{-1}\sqrt{2}$ [1 Mark]

SECTION-B

1). An air force plane is ascending vertically at the rate of 100 km/h. If the radius of the earth is r km, how fast is the area of the earth, visible from the plane, increasing at 3 minutes after it started ascending? Given that the visible area A at height h is given by.

$$A = \frac{2\pi r^2 h}{r+h} \quad [4 \text{ Mark}]$$

2). If a, b, c are the position vectors of the vertices A, B, C of a ΔABC respectively. Find an expression for the area of ΔABC and hence deduce the condition for the points A, B, C to be collinear. [4 Mark]

3). The volume of a spherical balloon being inflated changes at a constant rate. If initially its radius is 3 units and after 3 seconds it is 6 units. Find the radius of the balloon after t seconds. [4 Mark]

4). The probability of India winning a test match against West Indies is $1/3$. Assuming independence from match to match. Find the probability that in a 5 match series India's second win occurs at the third test. [4 Mark]

5). Find the foot of the perpendicular from the point $(1, 6, 3)$ to the line $x/1 = (y-1)/2 = (z-2)/3$. Also find the length of the perpendicular and the equation of the perpendicular. [4 Mark]

6). Form the differential equation of the family of curves $y = ae^x + be^{2x} + ce^{3x}$ where a, b, c are some arbitrary constants. [4 Mark]

7). A water tank has the shape of an inverted right circular cone with its axis vertical and vertex lowermost. Its semi-vertical angle is $\tan^{-1}(1/2)$. Water is poured into it at a constant rate of 5 cubic meters per minute. Find the rate at which the level of the water is rising at the instant when the depth of water in the tank is 20m. [4 Mark]

8). Find the particular solution of the differential equation: $dy/dx + y \cot x = 2x + x^2 \cot x$ ($x \neq 0$) given that $y = 0$ when $x = \pi/2$ [4 Mark]

9). Using LMVT, find a point on the curve $y = x^3 - 3x$, where the tangent to the curve is parallel to the chord joining $(1, -2)$ and $(2, 2)$. [4 Mark]

10). Find the image of the point $(2, -1, 5)$ in the line $(x-11)/10 = (y+2)/-4 = (z+8)/-11$. [4 Mark]

11). Find the equation of the plane, bisecting the angle in which the origin lies, between the planes $x+2y+2z=9$ and $4x-3y+12z+13=0$. [4 Mark]

12). A bullet is fired into a target and loses half the velocity after penetrating 9cm. How much further will it penetrate before coming to rest? [4 Mark]

SECTION - C

1). A toy manufacturer produces two types of dolls; a basic version doll A and deluxe version doll B. Each doll of type B takes twice as long to produce as one doll of type A. The company has time to make a maximum of 2000 dolls of type A per day, the supply of plastic is sufficient to produce 1500 dolls per day and each type requires equal amount of it. The deluxe version i.e. type B requires a fancy dress of which there are only 600 per day available. If the company makes a profit of Rs 3/- and Rs 5/- per doll respectively on doll A and B, how many of each should be produced weekly in order to maximize the profit? Solve it by graphical method. [6 Mark]

2). Find the shortest distance of the point $(0, c)$ from the parabola $y = x^2$, where $0 \leq c \leq 5$. [6 Mark]

3). Prove that the radius of the right circular cylinder of greatest curved surface area which can be inscribed in a given cone is half of that of the cone. [6 Mark]

4). Find the area of the lying circle $x^2 + y^2 = 2ax$ lying above x-axis and interior of the parabola: $y^2 = ax$ [6 Mark]5). Prove that all normal's to the curve $x = a \cos t + at \sin t$, $y = a \sin t - at \cos t$ are at a distance a from the origin. [6 Mark]

OR

A fruit grower can use two types of fertilizer in his garden, brand P and brand Q. The amounts (in kg) of nitrogen, phosphoric acid, potash, and chlorine in a bag of each brand are given in the table. Tests indicate that the garden needs at least 240 kg of phosphoric acid, at least 270 kg of potash and at most 310 kg of chlorine. If the grower wants to minimize the amount of nitrogen added to the garden, how many bags of each brand should be used? What is the minimum amount of nitrogen added in the garden? [6 Mark]

6). Evaluate: $\int x \log \sin x \, dx$. Lower limit -0 Upper limit- π [6 Mark]

