**Sample Paper 2013**

**Class XII**

 **Subject : Mathematic**

TIME: 3 hrs MAX. MARKS: 100

**INSTRUCTIONS:**

* The question paper consists of 3 pages.
* Diagrams/graphs are to be drawn only with a PENCIL; Calculators are NOT allowed.
* The paper consists of 29 questions with following marks distribution:
* Section A consists of 10 questions of 1 mark each.
* Section B includes questions 11 to 22 of 4 marks each.
* Section C includes questions 23 to 29 of 6 marks each.

---------------------------------------------------------------------------------------------------------------------------------------

**SECTION A**

Q.1: If f: [0,1] [0,1], defined by f(x) = x2 and g: [0,1] [0,1], defined by g(x) = 1 – x, then

 determine f(g(x)).

Q.2: Show that .

Q.3: If A = . Find a skew symmetric matrix using A and AT.

Q.4: Find adjoint of the matrix A = .

Q.5: Find the value of.

Q.6: Evaluate .

Q.7: Evaluate .

Q.8: If is a unit vector and () . ( + ) = 8. Find .

Q.9: Find the angle between the planes

 .

Q.10: Find the domain of the function f(x) = log x2 .

**SECTION B**

Q.11: Let X = Y = R – {1}. Show that the function f: X Y defined by is one-one

 and onto. Find f -1(x).

Q.12: If , then show that .

 OR

 Using properties of determinants, prove that

 .

Q.13: Show that .

Q.14: Find the domain and range of the following function:

 .

Q.15: If , then find at t =.

 OR

 Let . If U(x) = h(f(g(x))), then prove that

 .

Q.16: Show that the curves

 touch each other.

 OR

 Find the equation of normal to the curve

 at .

Q.17: Evaluate .

 OR

 Evaluate .

Q.18: Solve the differential equation

 given .

Q.19: Form the differential equation corresponding to the function .

Q.20: Find the value of the constant *M* such that the scalar product of the vector

 with the unit vector parallel to the sum of the vectors and

 is equal to one.

Q.21: (a) Find the length of the perpendicular from (1 , -1 , 2) to the plane 3x + 5y -4z = 5.

 (b) Prove that the angle between the line and the plane

 3x + 2y – z = 4 is .

Q.22: If the papers of 4 students can be checked by any of the 7 teachers, then show that

 the probability that all the 4 papers are checked by exactly 2 teachers is .

**SECTION C**

Q.23: Use product to solve the system of equations

 .

 **OR**

 Find the inverse of the matrix using elementary transformation.

Q.24: A window is in the form of a rectangle surmounted by a semi circle. Total perimeter of

 the window is 10 metres. Find the dimensions of the rectangle so as to admit

 maximum light through the whole opening.

Q.25: Using the method of integration, find the area of the region bounded by the lines

Q.26: Solve the differential equation

 given that when x = 3.

Q.27: Find the equation of the plane passing through the point (-1 , 3 , 2) and perpendicular

 to each of the planes .

Q.28: Given three identical boxes A, B and C each containing two coins. In box A, both the

 coins are gold coins, in box B both are silver coins and in box C there is one gold and

 one silver coin. A person chooses a box at random and takes out a coin. If the coin is

 of gold, what is the probability that the other coin in the box is also of gold.

Q.29: A factory makes badminton rackets and cricket bats. A racket takes 90 minutes of

 machine time and 3 hours of craft man’s time while the bat takes 3 hours of machine

 time and 60 minutes of craft man’s time. In factory, machine is not available for more

 than 42 hours and that of craft man for 24 hours. If the profit on a racket and a bat is

 Rs. 20 and Rs. 10 respectively, find the number of rackets and bats that the factory

 must manufacture to earn the maximum profit. Make it as an L.P.P. and solve

 graphically.

--------------------------------------------------------------------------------------------------------------------------