CLASS XII

SAMPLE PAPER

MATHS

Time: 3 hrs	Maximum Marks: 100

General Instructions:

(i) All questions are compulsory.

(ii) The question paper consists of 26 questions divided into three sections – A, B & C Section A contains 6 questions of 1 mark each. Section B contains13 questions of 4 marks each. Section C contains 7 questions of 6 marks each.

(iii) Use of calculators is not permitted .

SECTION – A

Q.1) The identity element for the binary operation * defined on Q ~ {0} as $a * b = ab/2\ \forall a, b \in$ Q ~ {0} is ____.

Q.2) The principal value of $\cos^{-1}\left(-\frac{1}{2}\right)$ is ______.

Q.3) If A=$\begin{pmatrix} 4 & 6 \\ 7 & 5 \end{pmatrix}$,then what is A.(adj A) ?

Q.4) The value of $\int_{-\pi}^{\pi} sin^3 x cos^2 x\, dx$ is _________.

Q.5) Evaluate: $\int \sqrt{1 + sin2x}$ dx.

Q.6) If a directions cosines of a line are k,k,k ,then k is -----.

SECTION – B

Q.7) Prove that the function f: N→ N, defined by f(x) = x^2+ x+1 is one – one but not onto.

Q.8) A school has to reward the students participating in co-curricular activities (Category I) and with 100% attendance (Category II) brave students (Category III) in a function. The sum of the numbers of all the three category students is 6. If we multiply the number of

category III by 2 and added to the number of category I to the result, we get 7.
By adding second and third category would to three times the first category we get 12.
Form the matrix equation and solve it.

Q.9) Prove that: $\cot^{-1} 7 + \cot^{-1} 8 + \cot^{-1} 18 = \cot^{-1} 3$.

OR

Find the value of $\sin\left(2\tan^{-1}\frac{2}{3}\right) + \cos\left(\tan^{-1}\sqrt{3}\right)$.

Q.10) If $a + b + c \neq 0, and \begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix} = 0$, then using properties of determinants, prove that a=b=c.

Q.11) Using elementary transformation, find the inverse of the matrix $\begin{bmatrix} 2 & 0 \\ 1 & 3 \end{bmatrix}$.

Q.12) If $x^y = e^{x-y}, prove\ that\ \frac{dy}{dx} = \frac{logx}{(1+logx)^2}$.

Or

Let f(x)= $\begin{cases} \frac{1-cos4x}{x^2}, & if\ x < 0 \\ a, & if x = 0 \\ \frac{\sqrt{x}}{\sqrt{16+\sqrt{x}}}, & if x > 0 \end{cases}$ .For what value of a, f is continuous at x=0?

Q.13) For the curve $y = 5x - 2x^3$, if x increases at the rate of 2 units/sec, then how fast is the slope of curve changing when $x = 3$?

OR

Find the condition for the curves $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1, xy = c^2$ to intersect orthogonally.

Q.14) Evaluate: $\int e^x \left(\frac{1-sinx}{1-cosx}\right) dx$

or

$\int (2x + 3)\sqrt{x^2 - 2x + 5}$ dx.

Q.15) If $x = a(tsint + cost) and\ y = a(sint - tcost), find\ \frac{d^2y}{dx^2}\ at\ t = \pi/2$.

Q.16) Find the general solution $of\ (x + 2y^3)\frac{dy}{dx} = y$.

Q.17) Solve : $2(y+3) - xy\frac{dy}{dx} = 0, given\ that\ y(1) = 2.$

Q.18) Determine the vector equation of a line passing through (1, 2, –4) and perpendicular to the two lines $\vec{r}$ =(8$\hat{i}$ −16 $\hat{j}$ +10$\hat{k}$) +λ (3$\hat{i}$−16 $\hat{j}$ + 7$\hat{k}$) and $\vec{r}$ =(15$\hat{i}$ + 29 $\hat{j}$ + 5 $\hat{k}$) +μ (3$\hat{i}$+ 8 $\hat{j}$ − 5$\hat{k}$) .

Q.19) A and B throw a pair of dice turn by turn. The first to throw 9 is awarded a prize. If A starts the game, show that the probability of A getting the prize is $\frac{9}{17}$.

SECTION – C

Q.20) Find the value of λ, if the points with position vectors $3\hat{i} - 2\hat{j} - \hat{k}, 2\hat{i} + 3\hat{j} - 4\hat{k},$ $-\hat{\imath} + \hat{\jmath} + 2\hat{k}$ & $4\hat{\imath} + 5\hat{\jmath} + \lambda\hat{k}$ are coplanar.

OR

Prove that in a Δ ABC, $\frac{sinA}{a} = \frac{sinB}{b} = \frac{sinC}{c}$,where *a*, *b*, *c* represent the magnitudes of the sides opposite to vertices A, B, C, respectively.

Q.21) Evaluate: $\int_0^4 (|x| + |x-2| + |x-4|\,)dx$

Q.22) Find the equation of the plane through the points A (1, 1, 0), B (1, 2, 1) and C (–2, 2,–1) and hence find the distance between the plane and the line $\frac{x-6}{3} = \frac{y-3}{-1} = \frac{z+2}{1}$.

OR

A plane meets the x, y and z axes at A, B and C respectively, such that the centroid of the triangle ABC is (1, –2, 3). Find the Vector and Cartesian equation of the plane.

Q.23) Bag I contains 3 red and 4 black balls and Bag II contains 4 red and 5 black balls. One ball is transferred from Bag I to Bag II and then two balls are drawn at random (without replacement) from Bag II. The balls so drawn are found to be both red in colour. Find the probability that the transferred ball is red.

OR

By examining the chest X ray, the probability that TB is detected when a person is actually suffering is 0.99. The probability of an healthy person diagnosed to have TB is 0.001. In a certain city, 1 in 1000 people suffers from TB. A person is selected at random and is diagnosed to have TB. What is the probability that he actually has TB?

Q.24) Find the dimensions of the rectangle of perimeter 36 cm which will sweep out a volume as large as possible, when revolved about one of its sides. Also find the maximum volume.

Q25). Find the area of the region included between the parabola $4y = 3x^2$ and the line $3x - 2y + 12 = 0$.

Q26) A dietician wishes to mix two types of food in such a way that the vitamin content of the mixture contain at least 8 unit of vitamin A and 10 unit of vitamin C. Food I contains 2unit/kg of vitamin A and 1unit/kg of vitamin C, while food II contains I unit/kg of vitamin A and 2unit/kg of vitamin C. It cost Rs.5.00 per kg to purchase food I and Rs.7.00 per kg to produce food II. Determine the minimum cost of the mixture. Formulate the LPP and solve it. Why a person should take balanced food?

****ALL THE BEST****