



CODE:1701-AG-F-4

पंजियन क्रमांक

REGNO:-TMC -D/79/89/36

General Instructions :-

1. All question are compulsory.
2. The question paper consists of 26 questions divided into three sections A,B and C. Section – A comprises of 6 question of 1 mark each. Section – B comprises of 13 questions of 4 marks each and Section – C comprises of 7 questions of 6 marks each .
3. There is no overall choice. However, internal choice has been provided in 4 question of four marks and 2 questions of six marks each. You have to attempt only one If the alternatives in all such questions.
4. Use of calculator is not permitted.
5. Please check that this question paper contains 8 printed pages.
6. Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.

सामान्य निर्देश :

1. सभी प्रश्न अनिवार्य हैं।
2. इस प्रश्न पत्र में 26 प्रश्न हैं, जो 3 खण्डों में अ, ब, व स है। खण्ड – अ में 6 प्रश्न हैं और प्रत्येक प्रश्न 1 अंक का है। खण्ड – ब में 13 प्रश्न हैं और प्रत्येक प्रश्न 4 अंको के हैं। खण्ड – स में 7 प्रश्न हैं और प्रत्येक प्रश्न 6 अंको का है।
3. प्रश्न संख्या 1 से 6 बहुविकल्पीय प्रश्न हैं। दिए गए चार विकल्पों में से एक सही विकल्प चुनें।
4. इसमें कोई भी सर्वोपरि विकल्प नहीं है, लेकिन आंतरिक विकल्प 4 प्रश्न 4 अंको में और 2 प्रश्न 6 अंको में दिए गए हैं। आप दिए गए विकल्पों में से एक विकल्प का चयन करें।
5. कैलकुलेटर का प्रयोग वर्जित है।
6. कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 4 हैं।
7. प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए कोड नम्बर को छात्र उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें।

Time : 3 Hours

अधिकतम समय : 3

Maximum Marks : 100

अधिकतम अंक : 100

Total No. Of Pages : 4

कुल पृष्ठों की संख्या : 4

CLASS – XII

MATHEMATICS

SECTION A

Q.1	Using derivative, find the approximate percentage increase in the area of a circle if its radius is increased by 2%.
Q.2	Write the direction ratio of the following line : $x = -3, \frac{y - 4}{3} = \frac{z - 2}{1}$
Q.3	If A is a square matrix satisfying $A^T A = I$. Write the value of $ A $.
Q.4	Give an example of a skew symmetric matrix of order 3.
Q.5	Find the derivative of $(e^{\tan x})$ w.r. to x at x = 0. It is given that $f'(1) = 5$.

Q.6	A plane meets the co – ordinates axes at A, B and C respectively such that centroid of triangle ABC is (1, -2, 3). Find the equation of the plan.
SECTION B	
Q.7	Without expanding the determinant at any stage, prove that $\begin{vmatrix} px+y & x & y \\ py+z & y & z \\ 0 & px+y & py+z \end{vmatrix} = 0$ if x, y, z are in GP, where $x \neq y \neq z$ and p is any real numbers.
Q.8	Find all point of discontinuity of f , where f is defined as following : $f(x) = \begin{cases} x +3 & \text{if } x \leq -3 \\ -2x-3 & \text{if } -3 < x < 3 \\ 6x+2 & \text{if } x \geq 3 \end{cases}$.
Q.9	Find the vector equation of the line parallel to the line $\frac{x-1}{5} = \frac{3-y}{2} = \frac{z+1}{4}$ and passing through the point (3 , 0,- 4) . Also find the distance between two lines .
Q.10	Evaluate : $\int e^{2x} \cdot \sin(3x + 1) dx$. OR $\int \frac{x^2}{x^4 + x^2 + 16} dx$.
Q.11	If $x = a \sin t$, $y = b \cos t$. Then find $\frac{d^2y}{dx^2}$ at $t = 0$.
Q.12	Solve for x : $\sin^{-1}(1-x) - 2 \sin^{-1} x = \frac{\pi}{2}$.
Q.13	Find the mean, the variance and the standard derivation of the number of doublets in three throws of a pair of dice.
Q.14	Find the interval in which the function $f(x) = (x+1)^3(x-3)^3$ is strictly increasing or strictly decreasing. Also, find the points of local maximum and local minimum, if any.
Q.15	Form the differential equation representing the family of ellipse having foci on x-axis and centre at the origin. OR Form the differential equation of the family of circles having radii 3.
Q.16	Find : $\int_0^{\pi/4} \frac{dx}{\cos^3 x \sqrt{2 \sin 2x}}$. OR Evaluate : $\int_0^{\pi/4} \frac{\sec x}{1 + 2 \sin^2 x} dx$.
Q.17	Let $A = Q \times Q$, where Q is the set of all rational numbers, and * be a binary operation on a defined by $(a, b) * (c, d) = (ac, b + ad)$ for $(a, b), (c, d) \in A$. Then find (i) The identity element of * in A. (ii) Invertible elements of A, OR Show that the relation R in the set $N \times N$ defined by $(a, b) R (c, d)$ iff $a^2 + d^2 = b^2 + c^2 \forall a, b, c, d \in N$, is an equivalence relation.
Q.18	Find the coordinates of the point where the line through the points A(3, 4, 1) and B(5, 1, 6) crosses the plane determined by the points P(2, 1, 2), Q(3, 1, 0) and R(4, -2, 1).
Q.19	Three schools A, B and C organized a mela for collecting funds for helping the rehabilitation of flood victims. They sold hand made fans, mats and plates from recycled material at a cost of Rs.

25, Rs. 100 and Rs. 50 each. The number of articles sold are given below :

School \ Article	A	B	C
Hand- fans	40	25	35
Mats	50	40	50
Plates	20	30	40

Find the funds collected by each school separately by selling the above articles. Also find the total funds collected for the purpose.

Write one value generated by the above situation.

SECTION C

Q.20 If $A = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 5 & 3 \\ 0 & 2 & 1 \end{bmatrix}$, find A^{-1} using elementary row transformation.

Q.21 An urn contains 3 red 5 black balls. A ball is drawn at random, its colour is noted and returned to the urn. Moreover, 2 additional balls of the colour noted down, are put in the urn and then two balls are drawn at random (without replacement) from the urn. Find the probability that both the balls drawn are of red colour.

OR

In an examination, 10 questions of true- false type are asked. A student tosses a fair coin and determine his answer to each question. If the coin falls heads, he answers true and if it falls tails, he answers false. Show that the probability that he answers at most 7 questions correctly is $\frac{121}{128}$.

Q.22 Using integration find the area of the region bounded by the parabola $x^2 + y^2 = 32$, x axis and the line $x = y$ in the first quadrant .

Q.23 Kellogg is a new cereal formed of a mixture of bran and rice that contains at least 88 grams of protein and at least 36 milligrams of iron. Knowing that bran contains 80 grams of protein and 40 milligrams of iron per kilogram, and that rice contains 100 grams of protein and 30 milligrams of iron per kilogram, find the minimum cost of producing this new cereal if bran costs Rs. 5 per kilogram and rice costs Rs. 4 per kilogram.

Q.24 If $\vec{a}, \vec{b}, \vec{c}$ are unit vectors such that $\vec{a} \cdot \vec{b} = \vec{a} \cdot \vec{c} = 0$ and the angle between \vec{b} and \vec{c} is $\frac{\pi}{6}$, then prove that (i) $\vec{a} = \pm 2(\vec{b} \times \vec{c})$, (ii) $[\vec{a} + \vec{b} \ \vec{b} + \vec{c} \ \vec{c} + \vec{a}] = \pm 1$.

Q.25 Find the area of the region enclosed by the parabola $x^2 = y$ the line $y = x + 2$ and the x- axis .

Q.26 A wet porous substance in the open air loses its moisture at a rate proportional to the moisture content .If a sheet hung in the wind loses half its moisture during the first hour, when will it have lost 90%, weather conditions remaining the same ?

OR

Solve the following differential equation, given that $y = 0$, when $x = \frac{\pi}{4}$: $\sin 2x \frac{dy}{dx} - y = \tan x$.

A MAN WHO DOESN'T TRUST HIMSELF ; CAN NEVER TRULY TRUST ANYONE ELSE

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