KRM

Series.	**K I**	R II	M III	GIV

Muskan Yadav

Roll No.		

Code No.-1 / 1 / **2**

Candidate must write the Code No. on the title page of the answer book.

- Please check that this question paper contains **4** printed pages.
- 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.
- Please check that this question paper contains **29** questions.
- Please write down the Serial Number of the question before attempting it.

FIRST TERM EXAMINATION 2017 -2018
CLASS XII
SUBJECT CODE - 041

Time allowed: **3 Hours** Maximum Marks: **100**

General Instructions:

1. All questions are compulsory.
2. This question paper consists of **29** questions divided into 4 sections **A, B, C** and **D**.
3. Question 1- 4 in Section **A** are very short-answer type questions carrying 1 mark each.
4. Question 5-12 in Section **B** are short-answer type questions carrying 2 marks each.
5. Question 13-23 in Section **C** are long-answer-I type questions carrying 4 marks each.
6. Question 24-29 in Section **D** are long-answer-II type questions carrying 6 marks each.
7. There is no overall choice. However, internal choice has been provided in **3** questions of four marks each and **3** questions of six marks each. You have to attempt only one of the given choices.

SECTION A

1 Find all the points at which the function $f(x)=\dfrac{4-x^2}{4x-x^3}$ is discontinuous .

2 If A is a matrix of order $m\times n$ and B is the matrix such that AB' and $B'A$ are both defined, then write down the order of B.

[A]m×n

3 Evaluate $\int\dfrac{1}{\sin^2 x\cos^2 x}dx$.

4 If $3\tan^{-1}x+\cot^{-1}x=\pi$, then find the value of x.

SECTION B

5 Find slope of the line at $\left(1,\sqrt{3}\right)$, which touches the circle having centre at (0,0) and radius 2cm .

6 Prove that $\sec^2\left(\tan^{-1}2\right)+\operatorname{cosec}^2\left(\cot^{-1}3\right)=15$.

7 If $A=\begin{bmatrix}0 & 2 & 0\\ 2 & 3 & 4\\ 4 & 5 & 6\end{bmatrix}$, then find the value of $A\times \mathrm{Adj}A$.

4800
3800
7200
15800

8 Prove that the differential equation $y\dfrac{dy}{dx}+x=c$ represent the family of circles.

9 Differentiate $\sec^{-1}\left(\dfrac{1}{4x^3-3x}\right), 0<x<\dfrac{1}{\sqrt{2}}$ with respect to x.

10 Evaluate $\displaystyle\int \frac{\cos 2x-\cos 2\alpha}{\cos x-\cos\alpha}dx$.

11 If A and B$'$ are independent events then prove that $P\left(A'\cup B\right)=1-P(A)P(B')$.

12 A balloon which always remain spherical has a variable diameter $\dfrac{3}{2}(2x+3)$. Find the rate of change in volume with respect to x.

SECTION C

13 If $\left(\tan^{-1}x\right)^2+\left(\cot^{-1}x\right)^2=\dfrac{5\pi^2}{8}$, then find x.

14 Using properties of determinants ,prove that

$$\begin{vmatrix}1+a^2-b^2 & 2ab & -2b\\ 2ab & 1-a^2+b^2 & 2a\\ 2b & -2a & 1-a^2-b^2\end{vmatrix}=\left(1+a^2+b^2\right)^3.$$

$1+a^2+b^2$

OR

Prove that $\begin{vmatrix}yz-x^2 & zx-y^2 & xy-z^2\\ zx-y^2 & xy-z^2 & yz-x^2\\ xy-z^2 & yz-x^2 & zx-y^2\end{vmatrix}$ is divisible by $(x+y+z)$.Find quotient also.

15 There are two families A and B . There are 4 men , 6 women and 2 children in family A and 2 men,2 women and 4 children in family B. The recommended daily amount of calories is 2400, 1900 and 1800 for each men ,each women and each child respectively. The amount of proteins is 45 grams , 55grams and 33grams for each men ,each women and each child respectively. Represent the above information using matrices. Using matrix multiplication , find total requirement of calories and proteins for each of the two families. What awareness can you create among people about the balanced diet.

[M W C] [2400] [2400 19 18]

16 Find the intervals in which the function $f(x)=\dfrac{4\sin x}{2+\cos x}-x$ is strictly increasing.

OR

The equation of tangent at (2,3) to the curve $y^2=ax^3+b$ is $y=4x-5$. Find the values of a and b

17 If the function f defined by

$$f(x)=\begin{cases}\dfrac{1-\sin^3 x}{3\cos^2 x} & \text{If } x<\dfrac{\pi}{2}\\ a & \text{If } x=\dfrac{\pi}{2}\\ \dfrac{b(1-\sin x)}{(\pi-2x)^2} & \text{If } x>\dfrac{\pi}{2}\end{cases}$$

is a continuous function at $x=\dfrac{\pi}{2}$, find a and b.

18 If $x\cos(a+y)=\cos y$, then show that $\sin a\dfrac{d^2y}{dx^2}+\sin 2(a+y)\dfrac{dy}{dx}=0.$

OR

If $y=x^3\log\left(\dfrac{1}{x}\right)$, then prove that $x\dfrac{d^2y}{dx^2}-2\dfrac{dy}{dx}+3x^2=0.$

19 Find $\int\dfrac{(3\sin x-2)\cos x}{13-\cos^2 x-7\sin x}dx.$

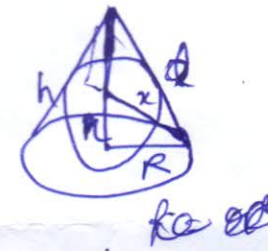
20 Three persons A ,B and C fires at a target in turn, starting with A. Their probabilities of hitting the target are 0.4,0.3 and 0.2 respectively. Find the probability that exactly two of them hit the target.

21 Find the particular solution of the differential equation

$e^x\sqrt{1-y^2}\,dx+\dfrac{y}{x}dy=0$ given that y=1 when x=0.

22 Form a differential equation satisfying the equation $y=ae^{2x}+be^{-2x}$ by eliminating arbitrary constants a and b.

23 Evaluate $\int_{-1}^{2}\left|x^3-x\right|dx.$



SECTION D

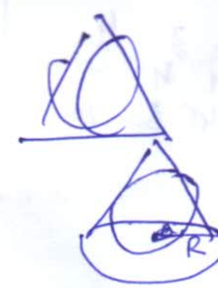
24 Show that the altitude of right circular cone of maximum volume that can be inscribed in a sphere of radius r is $\frac{4r}{3}$. Also find the maximum volume.

OR

Show that the maximum volume of cylinder which can be inscribed in a cone of height h and semi vertical angle α is $\frac{4}{27}\pi h^3 \tan^2 \alpha$.

25 A shopkeeper has three varieties of pens A ,B and C. Meenu purchased one pen of each variety for a total of ₹21. Jeevan purchased 4 pens of A variety ,3 pens of B variety and 2 pens of C variety for ₹ 60. While Shikha purchased 6 pens of A variety ,2 pens of B variety and 3 pens of C variety for ₹70 .Using matrix method , find cost of each variety of pen.

26 Evaluate $\int_1^4 \left(3x^2+2x\right)dx$ as the limit of the sum.



OR

Evaluate $\int (x+3)\sqrt{3-4x-x^2}\,dx.$

27 A ,B and C throw a pair of dice in that order alternatively till one of them gets a total of 9 and win the game. Find their respective probabilities of winning if A starts the game.

28 Find the area of the part of the circle $x^2+y^2=16$ which is exterior to the parabola $y^2=6x$.

$\frac{1}{|A|} \times adjA$

OR

Using integration , find the area of region bounded by the triangle whose vertices are (-2 , 1),(0 ,4) and (2 , 3).

29 A diet is to contain at least 80 units of vitamin A and 100 units of minerals. Two food F1 and F2 are available. Food F1 costs ₹4per unit and F2 costs₹6 per unit. One unit of food F1 contain 3 units of vitamin A and 4 units of minerals. One unit of food F2 contain 6 unit of vitamin A and 3 units of minerals. Formulate this as L.P.P. and find graphically the minimum cost for diet that consists of mixture of these two foods and also meet the minimum nutritional requirements.