

ANNUAL EXAMINATION, 2018-19

MATHEMATICS

Time : 3 hrs.

Class - XI

M.M. : 100

Name of the student _____ Section _____ Date – 22.02.2019 (Friday)

General Instructions :

- All questions are **compulsory**.
- This question paper is divided into four sections, **Section A** contains **4 questions** each carrying **1 mark**, **Section B** contains **8 questions** each carrying **2 marks**, **Section C** contains **11 questions** each carrying **4 marks** and **Section D** contains **6 questions** each carrying **6 marks**.
- **Question No. 17** must be attempted in **graph paper**.
- Graph paper will be provided to you.
- Use of **calculator** or any other **electronic devices** is **not allowed**.
- **Please check that this question paper contains 02 printed pages.**

SECTION-A

- Q.1** Evaluate $(-\sqrt{-1})^{4n+3}$, $n \in \mathbb{N}$.
- Q.2** Find the ratio in which the line joining (1, 2, 3) and (-3, 4, -5) is divided by xy-plane.
- Q.3** Evaluate $\lim_{x \rightarrow 0} \frac{e^{\sin x} - 1}{x}$
- OR**
- $\lim_{x \rightarrow 0} \frac{2^x - 3^x}{x}$
- Q.4** Write the negation of the statement 'square of an integer is positive or negative'.

SECTION-B

- Q.5** Two finite sets have 'm' and 'n' elements. The total number of subsets of the first set is 56 more than the total number of subsets of the second. Find the values of 'm' and 'n'.
- Q.6** Express -6 radians into degree.
- OR**
- A railway train is travelling on a curve of 500m radius at the speed of 66 km/hr. Through what angle will it turn in 20 seconds ?
- Q.7** Find n, if ${}^9P_5 + 5 \cdot {}^9P_4 = {}^{10}P_n$
- OR**
- In how many ways can the letters of the word 'FRACTION' be arranged so that no two vowels are together ?
- Q.8** Which term of the series $\frac{1}{4} - \frac{1}{2} + 1 + \dots$ is 256.
- Q.9** If a, b, c are in GP and $a^{1/x} = b^{1/y} = c^{1/z}$, show that : x, y, z are in AP.
- Q.10** Find the equation of a line parallel to y-axis and drawn through the point of intersection of $x - 7y + 5 = 0$ and $3x + y - 4 = 0$.
- OR**
- Reduce $\sqrt{3}x + y - 4 = 0$ to the normal form and hence find 'p' and 'ω'.
- Q.11** A coin is tossed. If it shows a head, we draw a ball from a bag consisting of 2 blue and 3 white balls. If it show a tail, throw a die. Describe the sample space.
- Q.12** Solve the inequality : $-5 \leq \frac{5-3x}{2} \leq 8$.

SECTION-C

Q.13 Find the domain and the range of the function $f(x) = \frac{1}{\sqrt{1-x^2}}$.

Q.14 Prove that : $1 + \cos 2x + \cos 4x + \cos 6x = 4 \cos x \cdot \cos 2x \cdot \cos 3x$.

OR

In a triangle ABC, show that : $a \cos A + b \cos B + c \cos C = 2a \sin B \cdot \sin C$.

Q.15 Using PMI, show that : $1 + \frac{1}{1+2} + \frac{1}{1+2+3} + \dots + \frac{1}{1+2+3+\dots+n} = \frac{2n}{n+1}$

Q.16 Solve : $x^4 - 8x^2 - 9 = 0$.

Q.17 Solve graphically - $2x + y \geq 4$; $x + y \leq 3$, $2x - 3y \leq 6$.

Q.18 How many five digit numbers divisible by 3 can be formed using the digits 0, 1, 2, 3, 4, 7 and 8 if each digit is to be used atmost once ?

Q.19 Find 'a' so that the term independent of 'x' in $\left(\sqrt{x} + \frac{a}{x^2}\right)^{10}$ is 405.

Q.20 Find the sum of first 24 terms of the AP a_1, a_2, a_3, \dots , if $a_1 + a_5 + a_{10} + a_{15} + a_{20} + a_{25} = 225$.

OR

Find the sum of the series upto 'n' terms : $5 + 7 + 13 + 31 + 85 + \dots$

Q.21 Find the equation of the circle whose center is (3, -1) and which cut off an intercept of lengths 6 from the line $2x - 5y + 18 = 0$.

Q.22 Evaluate : $\lim_{x \rightarrow 0} \frac{\tan x - \sin x}{x^3}$ **OR** Differentiate $f(x) = x^{1/2}$ using first principle.

Q.23 A coin is tossed 5 times. A man wins Re. 1 if he gets a head and loses Rs. 1.5 if he gets a tail. Find the probability of different amount he wins / losses.

SECTION-D

Q.24 In a survey of 100 students, the number of students studying the various languages were found to be: English only 18, English but not Hindi 23, English and Sanskrit 8, English 26, Sanskrit 48, Sanskrit and Hindi 8, no language 24. Find :

- i) how many students were studying Hindi?
- ii) how many students were studying English and Hindi?

Q.25 If α and β are solutions of the equation $a \cos \theta + b \sin \theta = c$, show that : $\cos(\alpha + \beta) = \frac{a^2 - b^2}{a^2 + b^2}$

OR

$$\text{Solve : } \cos \theta \cdot \cos 2\theta \cdot \cos 3\theta = \frac{1}{4}$$

Q.26 Solve : $x^2 - (7 - i)x + (18 - i) = 0$ over 'C'.

Q.27 Find the equation of the straight line which makes a triangle of area $96\sqrt{3}$ with the axes and perpendicular from the origin to it makes an angle of 30° with y-axis.

Q.28 Find the vertex, focus, directrix and length of the latus rectum of the parabola : $y^2 - 4y - 2x - 8 = 0$.

OR

An arch is in the form of a semi-ellipse. It is 8m wide and 2m high at the centre. Find the height of the arch at a point 1.5m from one end.

Q.29 For the individual series $x_1, x_2, x_3, \dots, x_n$ show that : $\frac{\sum (x_i - \bar{x})^2}{n} = \frac{\sum x_i^2}{n} - (\bar{x})^2$

Using this or otherwise, find the remaining two observations out of seven, which are 6, 7, 10, 12, 14; given that mean and variance of the 7 observations are 8 and 16 respectively.

OR

Find the coefficient of variance for the following data :

Class	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45
No. of items	20	24	32	28	20	16	34	10	16

