**Session Ending Examination 2014-2015 Set 1**

**Class XI (Mathematics)**

**Time : 3 Hrs** **M.M: 100**

**General Instructions:**

**a)** All the questions are compulsory.

**b)** The Question Paper consists of 26 Questions divided into three sections A, B and C

**c)** Section-**A** comprises of 6 questions of **one** mark each.

**d)** Section-**B** consists of 13 questions of **four** marks each.

**e)** Section-**C** comprises of 7 questions of **Six** marks each.

**f)** There is no overall choice. However, an internal choice has been provided in 4 questions of four marks each and 2 questions of six marks each. You have to attempt only one of the alternatives in all such questions.

**g)** Use of calculator, is not permitted.

## SECTION – A

**1.** *If* $X = \{a, b, c, d\}$ *and* $Y = \{f, b, d, g\}$. *find* $X - Y$.

**2.** Solve $3x - 7 > 5x - 1$.

**3.** Fine the centre and radius of the circle : $(x+5)^2 + (y-3)^2 = 36$

**4.** Write the contrapositive of the statement

"If x is a prime number, then x is odd."

**5.** Write the negation of the statement.

“All triangles are not equilateral triangles”.

**6.** Write the converse of the statement

If a rectangle ‘R’ is square, then R is a Rhombus.”

**SECTION – B**

**7.** Define a relation R on the set N of natural numbers by R={(x,y); y=x+5, x is natural number less than 4, x, y $\in$ N }

**a)** roster form and

**b)** an arrow diagram.

Write down the domain and range.

**8.** Prove that

$$\sin^2 6x - \sin^2 4x = \sin 2x \sin 10x$$

$$Or$$

$$\sin 2x + 2\sin 4x + \sin 6x = 4\cos^2 x \sin 4x$$

**9.** Find the general solution of the equation $\sec^2 2x = 1 - \tan 2x$

**10.** Prove by using Principal of Mathematical Induction for all $n \in N$

$$1.2 + 2.2^2 + 3.2^3 + \ldots\ldots\ldots\ldots\ldots\ldots + n.2^n = (n-1)2^{n+1} + 2$$

**OR**

Prove by using Principle of Mathematical induction for all $n \in N$ $3^{2n+2} - 8n - 9$ is divisible by 8.

**11.** In how many ways can a student choose a program of 5 courses. If 9 courses are available and 2 specific courses are compulsory for every student?

**OR**

If the different permutations of all the letters of word; EXAMINATION' are listed as in a dictionary, how many words are there in this list before the first word starting with E?

**12.** If the first and the $n^{th}$ terms of a G.P. are 'a' and 'b', respectively, and if P is the product of the first n terms, prove that $p^2 = (ab)^n$

**13.** Find the equation of the line passing through the mid-point of (-2, 4), (-4, 6) and perpendicular to the line through the point (2, 5) and (-3, 6).

14. Find the coordinates of the focus, axis of the parabola, the equation of the directrix and the length of the latus rectum of the parabola whose equation is $x^2 = 6y$

**15.** Using section formula, prove that the three points (-4, 6, 10), (2, 4, 6 ) and (14, 0, -2 ) are collinear.

**16.** Find the mean and the variance for the following distribution:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Xi | 6 | 10 | 14 | 18 | 24 | 28 | 30 |
| fi | 2 | 4 | 7 | 12 | 8 | 4 | 3 |

**OR**

Find the mean deviation about median for the following date:

| | | | | | |
|---|---|---|---|---|---|
| $x_i$ | 15 | 21 | 27 | 30 | 35 |
| $f_i$ | 3 | 5 | 6 | 7 | 8 |

**17.** A and B are two events such that p(A)=0.54, P(B)=0.69 and $P(A \cap B) = 0.35$

Find (i) $P(A \cup B)$ $(ii)\, P(A' \cap B')$ $(iii)\, P(A \cap B')$ $(iv)$ $P(B \cap A')$

**18.** Three letters are dictated to three persons and an envelope is addressed to each of them, the letters are interested into the envelope at random so that each envelope contains exactly one letter. Find the probability that at least one letter is in its proper envelope.

**19.** Let A, B and C be the sets such that $A \cup B = A \cup C$ *and* $A \cap B = A \cap C$. show that

B=C.

**SECTION –C**

**20.** There are 200 individual with a skin disorder, 120 had been exposed to the chemical $C_2$. Find the number of individuals exposed to –

**a)** Chemical $C_1$ but not chemical $C_2$

**b)** Chemical $C_2$ but not chemical $C_1$

**c)** Chemical $C_1$ or chemical $C_2$

Exposure to UV rays result in skin disorders, what prevents harmful UV rays from sun to reach earth?

**21.** Prove that in any triangle $(b-c)\cot\frac{A}{2}+(c-a)\cot\frac{B}{2}+(a-b)\cot\frac{C}{2}=0$

**22.** Find $\theta$ such that $\frac{3+2i\sin\theta}{1-2i\sin\theta}$ is purely real.

**23.** Solve the following system of inequalities graphically. $3x+2y\le 150,\quad x+4y\le 80,\quad x\le 15,\ y\ge 0,\quad x\ge 0$

**24.** Find n, if the ratio of the fifth them from the beginning to the fifth term from the end in the expansion of $\left(\sqrt[4]{2}+\frac{1}{\sqrt[4]{3}}\right)^n$ is $\sqrt{6:1}$

**Or**

The Coefficients' of three consecutive terms in the expansion of $(1+a)^n$ are in the ratio 1: 7:,42. Find n.

**25.** Find the sum of the following series upto n terms

$$\frac{1^3}{1}+\frac{1^3+2^3}{1+3}+\frac{1^3+2^3+3^3}{1+3+5}+------$$

**OR**

If p, q, r are in G.P. and the equations, $px^2 + 2qx + r = 0 \;\; and \;\; dx^2 + 2ex + f = 0$ have a common root, then show that $\frac{d}{p}, \frac{e}{q}, \frac{f}{r}$ are in A.P.

**26.**

**a)** Evaluate $\lim_{x \to 0} \frac{\sin ax + bx}{ax + \sin bx} \qquad a.b. \;\; a + b \neq 0$

**b)** Fine the derivative of $\frac{x^5 - \cos x}{\sin x}$