SUMMATIVE ASSESSMENT – I, 2016-17
MATHEMATICS
Class – X

Time Allowed: 3 hours **Maximum Marks: 90**

General Instructions:

1. All questions are **compulsory.**
2. The question paper consists of 31 questions divided into four sections A, B, C and D. Section-A comprises of 4 questions of 1 mark each; Section-B comprises of 6 questions of 2 marks each; Section-C comprises of 10 questions of 3 marks each and Section-D comprises of 11 questions of 4 marks each.
3. There is no overall choice in this question paper.
4. Use of calculator is not permitted.

SECTION-A

Question numbers **1** to **4** carry one mark each

1 R and S are points on the sides DE and EF respectively of a ΔDEF such that ER = 5 cm, RD = 2.5 cm, SD = 1.5 cm and FS = 3.5 cm. Find whether RS || DF or not. 1

2 If $\sec(7° - 2\alpha) = \operatorname{cosec}(5\alpha - 7°)$, then find the value of α 1

3 Simplify: $\frac{1}{\sec^2\theta} + \frac{1}{\operatorname{cosec}^2\theta}$. 1

4 Write the empirical relationship between the three measures of central tendency. 1

SECTION-B

Question numbers **5** to **10** carry two marks each.

5 Explain why $(11 \times 7 \times 5 \times 4 \times 3 \times 2 + 3)$ is a composite number? 2

6 State whether the real number 52.0521 is rational or not. If it is rational express it in the form $\frac{p}{q}$, where p,q are co-prime, integers and $q \neq 0$. What can you say about prime factorization of q? 2

7 Given the linear equation $2x + 3y - 12 = 0$, write another linear equation in these variables, such that the geometrical representation of the pair so formed is : 2

(i) parallel lines (ii) coincident lines

8 In a rectangle ABCD, E is a point on AB such that $AE = \frac{3}{4}AB$. 2

If AB = 16 m and AD = 5 m, then find the length of DE.

9 If $\sin(2x + 3y) = 1$; $\cos(2x - 3y) = \frac{\sqrt{3}}{2}$, find the values of x and y. 2

10 Given below is a frequency distribution table showing daily income of 50 workers of a factory 2

Daily income of Workers (in ₹)	200-250	250-300	300-350	350-400	400-450
Number of workers	06	10	12	08	14

Change this table to a 'less than type' cumulative frequency table.

SECTION-C

Question numbers **11** to **20** carry three marks each.

11 An army contingent of 678 soldiers is to march behind an army band of 36 members in a Republic Day parade. The two groups are to march in the same number of 3

columns. What is the maximum number of columns they can march?

12 What must be subtracted from the polynomial $x^4-4x^3-39x^2-46x-2$ so that the resulting polynomial is exactly divisible by x^2-5x+6. 3

13 Show that $2, -1$ and $\frac{1}{2}$ are the zeroes of the cubic polynomial $p(x)=2x^3-3x^2-3x+2$ and then verify that the sum of the zeroes $= \frac{-\text{ coeff of } x^2}{\text{coeff of } x^3}$ 3

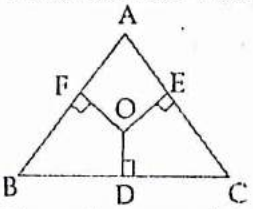
14 $\frac{2}{\sqrt{x}}+\frac{3}{\sqrt{y}}=2$ और $\frac{4}{\sqrt{x}}-\frac{9}{\sqrt{y}}=-1$ 3

Solve the following pair of equations :

$\frac{2}{\sqrt{x}}+\frac{3}{\sqrt{y}}=2$ and $\frac{4}{\sqrt{x}}-\frac{9}{\sqrt{y}}=-1$

15 In ΔABC, from any interior point O of the triangle, $OD \perp BC$, $OE \perp AC$ and $OF \perp AB$ are drawn. 3

Prove that $OA^2+OB^2+OC^2=OD^2+OE^2+OF^2+AF^2+BD^2+CE^2$.



16 Prove that area of the equilateral triangle described on the side of a square is half of the area of the equilateral triangle described on its diagonal. 3

17 Given $\sin\theta=\frac{15}{17}$, find the value of : 3

$\frac{3-4\sin^2\theta}{4\cos^2\theta-3}$

18 $\frac{(1+\sin\theta)^2+(1-\sin\theta)^2}{2\cos^2\theta}=\frac{1+\sin^2\theta}{1-\sin^2\theta}$ 3

Prove that :

19 The following distribution table shows the daily pocket money of Class IX students of a school 3

Pocket money (in ₹)	0-25	25-50	50-75	75-100	100-125
Number of students	8	18	25	15	4

Find the mean Pocket money.

20 Weights of students of Class X are given in the following frequency distribution : 3

Weight (in kg)	40-44	44-48	48-52	52-56	56-60	60-64
Number of students	9	10	15	8	7	1

Find the modal weight.

SECTION-D

Question numbers 21 to 31 carry four marks each.

21 What is the HCF and LCM of two prime numbers a and b? 4

Three alarm clocks ring at intervals of 6, 9 and 15 minutes respectively. If they start ring together, after what time will they next ring together?

22 If a polynomial $4x^4 - 4x^3 - 35x^2 + 36x - 9$ has two zeroes as 3 and -3, then find the other zeroes. 4

23 Solve graphically the pair of linear equations : 4

$3x - 2y + 7 = 0$

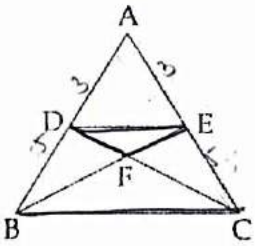
$2x + 3y - 4 = 0$

Also shade the region enclosed by these lines and x – axis.

24 Three lines $x + 3y = 6$, $2x - 3y = 12$ and $x = 0$ are enclosing a beautiful triangular park. Find the points of intersection of the lines graphically and the area of the park, if all measurements are in km. What type of behavior should be expected by public in these type of parks? 4

25 In a trapezium ABCD, AB||CD and DC = 4 AB. Also, EF||AB intersect DA and CB at E and F such that $\frac{AE}{ED} = \frac{3}{2}$. Prove that 5 EF = 14 AB. 4

26 In a ΔABC, DE||BC. If AD: DB = 3: 5 then find $\frac{ar\ (\Delta DFE)}{ar\ (CFB)}$. 4



27 4

If $\theta = 60°$, show that :

(i) $\sin\theta = \frac{\tan\theta}{\sqrt{1 + \tan^2\theta}}$

(ii) $\tan\theta = \frac{\sqrt{1 - \cos^2\theta}}{\cos\theta}$

28 If $\text{cosec}\theta - \cot\theta = \sqrt{2}\ \cot\theta$, then prove that $\text{cosec}\theta + \cot\theta = \sqrt{2}\ \text{cosec}\theta$. 4

29 Prove that : 4

$$\frac{\cot\theta + \text{cosec}\theta - 1}{\cot\theta - \text{cosec}\theta + 1} = \frac{1 + \cos\theta}{\sin\theta}$$

30 The annual profits earned by shops of a particular shopping mall are given in the following distribution : 4

Profit (in lakhs ₹)	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50
Number of shops	4	8	15	20	25	18	12	7	2

Draw a 'less than type' ogive and a 'more than type' ogive for this data.

31 Find the median and mode of the following data : 4

Class interval	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100	100 – 120	120 – 140
Frequency	6	8	10	12	6	5	3