Class – X Exam 2021-22 (TERM – II)

Mathematics Standard (041)

Time Allowed: 120 minutes **Maximum Marks: 40**

General Instructions:

1. The question paper consists of 14 questions divided into 3 sections A, B, C.
2. All questions are compulsory.
3. Section A comprises of 6 questions of 2 marks each. Internal choice has been provided in two questions.
4. Section B comprises of 4 questions of 3 marks each. Internal choice has been provided in one question.
5. Section C comprises of 4 questions of 4 marks each. An internal choice has been provided in one question. It contains two case study based questions.

SECTION A

1. Solve for x : $\frac{1}{x}+\frac{2}{2x-3}=\frac{1}{x-2}, x \neq 0, \frac{2}{3}, 2$.

OR

Find the nature of roots of the quadratic equation $x^2-4x+3\sqrt{2}=0$.

2. If S_n the sum of first n terms of an AP is given by $S_n = 3n^2 - 4n$, find the n^{th} term.

3. If the sum of first n terms of an AP is n^2, then find its 10th term.

4. Draw a line segment of length 7 cm. Find a point P on it which divides it in the ratio 3 : 5.

5. A heap of rice is in the form of a cone of base diameter 24 m and height 3.5 m. Find the volume of the rice. How much canvas cloth is required to just cover the heap?

6. Find the median for the given frequency distribution:

Class	40-45	45-50	50-55	55-60	60-65	65-70	70-75
Frequency	2	3	8	6	6	3	2

OR

If the mean of the squares of first n natural numbers is 105, then find the first n natural numbers.

Section B

7. An electric pole is 10 m high. A steel wire tied to top of the pole is affixed at a point on the ground to keep the pole up right. If the wire makes an angle of 45° with the horizontal through the foot of the pole, find the length of the wire. [Use $\sqrt{2} = 1.414$]

8. Draw a circle of radius 3.5 cm. From a point P, 6 cm from its centre, draw two tangents to the circle.

9. Metallic spheres of radii 6 cm, 8 cm and 10 cm respectively are melted to form a solid sphere. Find the radius of the resulting sphere.

10. If the median of the following data is 240, then find the value of f :

Classes	0- 100	100-200	200-300	300-400	400-500	500-600	600-700
Frequency	15	17	f	12	9	5	2

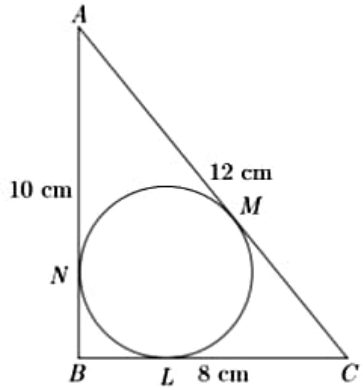
OR

The sum of deviations of a set of values $x_1, x_2, x_3, \ldots\ldots\ldots, x_n$, measured from 50 is -10 and the sum of deviations of the values from 46 is 70. Find the value of n and the mean.

Section C

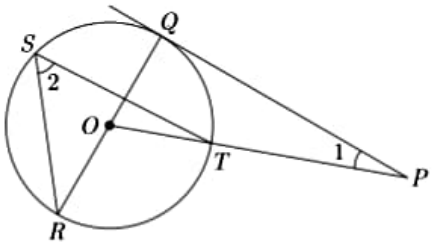
11. The angles of depression of the top and bottom of a 8 m tall building from the top of a multi storied building are $30°$ and $45°$, respectively. Find the height of the multi storied building and the distance between the two buildings.

12. In figure, a circle is inscribed in a ΔABC having sides $BC = 8$ cm, $AB = 10$ cm and $AC = 12$ cm. Find the length BL, CM and AN.



OR

In figure PQ is a tangent from an external point P to a circle with centre O and OP cuts the circle at T and $\angle QOR$ is a diameter. If $\angle POR = 130°$ and S is a point on the circle, find $\angle 1 + \angle 2$.



13. Seating Capacity : The Fox Theater creates a "theater in the round" when it shows any of Shakespeare's plays. The first row has 80 seats, the second row has 88, the third row has 96, and so on.

(i) How many seats are in the 25th row?

14. Living Index : Cost of living indexes are meant to compare the expenses an average person can expect to incur to acquire food, shelter, transportation, energy, clothing, education, healthcare, childcare, and entertainment in different regions. A cost of living index is also used to track how much the costs of basic expenses rise over a period.

The weekly observation on cost of living index in a certain city for a particular year are given below. Observe the following table:

Cost of Living Index	Number of weeks
140-150	5
150-160	10
160-170	20
170-180	9
180-190	6
190-200	2
Total	52

Based on the above information, answer the following questions.

(i) What is the approximate mean weekly cost-of living index ?

(ii) What will be the lower limit of the modal class ? What is the upper limit of median class?

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