**Time Allowed: 90 minutes Maximum Marks: 40**

General Instructions:

1. The question paper contains three parts A, B and C.
2. Section A consists of 20 questions of 1 mark each. Any 16 questions are to be attempted.
3. Section B consists of 20 questions of 1 mark each. Any 16 questions are to be attempted.
4. Section C consists of 10 questions based on two Case Studies. Attempt any 8 questions.
5. There is no negative marking.

SECTION A

Section A consists of 20 questions of 1 mark each. Any 16 questions are to be attempted.

1. If HCF$(336, 54) = 6$, LCM$(336, 54)$ will be

(a) 2024
(b) 3024
(c) 1012
(d) 1512

2. Select the value of k for which the pair of Linear equations $kx + y = d^2$ and $x + ky = 1$ have infinitely many solutions.

(a) 1
(b) 2
(c) 3
(d) 4

3. In the given figure, P and Q are the points on the sides AB and AC respectively of ΔABC, such that $AP = 3.5$ cm, $PB = 7$ cm, $AQ = 3$ cm and $QC = 6$ cm. If $PQ = 4.5$ cm, the length BC. will be
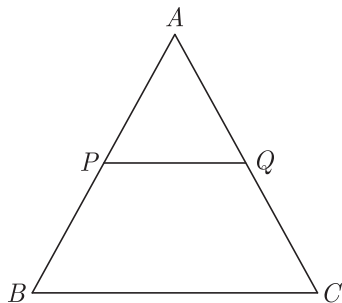

(a) 10.5 cm
(b) 12.5 cm
(c) 13.5 cm
(d) 11.5 cm

4. The area of a right angled triangle is 40 sq cm and its perimeter is 40 cm. The length of its hypotenuse is

(a) 16 cm
(b) 18 cm
(c) 17 cm
(d) data insufficient

5. On a single roll of a die, the probability of getting a number less than 7 is ....

(a) 0.5
(b) 0.4
(c) 0
(d) 1

6. In Figure, ABC is an isosceles triangle right angled at C with $AC = 4$ cm, the length of AB will be
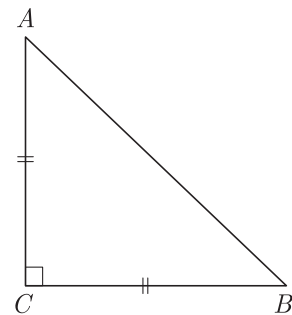
(a) $4\sqrt{3}$
(b) $4\sqrt{2}$
(c) $2\sqrt{2}$
(d) $3\sqrt{2}$

7. In the adjoining figure, the length of BC is
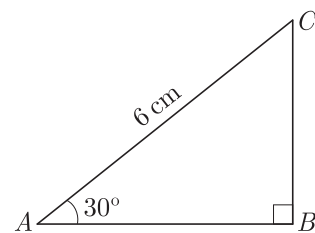
(a) $2\sqrt{3}$ cm
(b) $3\sqrt{3}$ cm
(c) $4\sqrt{3}$ cm
(d) 3 cm

8. The rational form of $0.2\overline{54}$ is in the form of $\frac{p}{q}$ then $(p + q)$ is

(a) 14
(b) 55
(c) 69
(d) 79

9. If $ad \neq bc$, then what do you say about the solution of the pair of linear equations $ax + by = p$ and $cx + dy = q$?

(a) no solution
(b) unique solution
(c) infinitely solution
(d) can't say anything

10. If the point $C(k, 4)$ divides the line segment joining two points $A(2, 6)$ and $B(5, 1)$ in ratio $2 : 3$, the value of k is ....

(a) $\frac{5}{16}$

(b) $\frac{16}{5}$

(c) $\frac{9}{5}$

(d) $\frac{5}{9}$

11. The graph of a polynomial is shown in Figure, then the number of its zeroes is
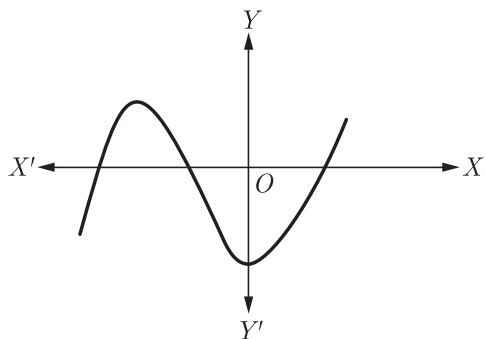
(a) 3

(b) 1

(c) 2

(d) 4

12. Select the least number that is divisible by all numbers between 1 and 10 (both inclusive).

(a) 2520

(b) 5040

(c) 1010

(d) 2020

13. If θ be an acute angle and $5 \csc \theta = 7$, then value of $\sin \theta + \cos^2 \theta - 1$ will be

(a) $\frac{10}{49}$

(b) $\frac{39}{49}$

(c) $\frac{10}{47}$

(d) $\frac{37}{47}$

14. If $\sin \theta + \sin^2 \theta = 1$ then $\cos^2 \theta + \cos^4 \theta = ?$

(a) 1

(b) 2

(c) $2\sqrt{2}$

(d) $2\sqrt{3}$

15. It is proposed to build a single circular park equal in area to the sum of areas of two circular parks of diameters $16\,\text{m}$ and $12\,\text{m}$ in a locality. The radius of the new park would be
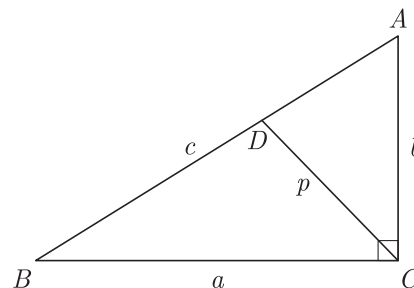
(a) $10\,\text{m}$

(b) $15\,\text{m}$

(c) $20\,\text{m}$

(d) $24\,\text{m}$

16. $ABCD$ is a trapezium in which $AB \,||\, CD$ and its diagonals intersect each other at the point O. Which of the following is correct relation ?

(a) $\frac{AO}{BO} = \frac{2DO}{CO}$

(b) $\frac{AO}{BO} = \frac{DO}{CO}$

(c) $\frac{AO}{BO} = \frac{CO}{DO}$

(d) $\frac{AO}{BO} = \frac{2CO}{DO}$

17. Triangle ABC is right angled at C. Let $BC = a$, $CA = b, AB = c$ $PQR, ST \,||\, QR$ and p be the length of perpendicular from C to AB. The cp is equal to

(a) ab

(b) $\sqrt{ab}$

(c) $\frac{a+b}{2}$

(d) $2ab$

18. $\dfrac{\sin A - 2\sin^3 A}{2\cos^3 A - \cos A} = ?$

(a) $\sin A$

(b) $\tan A$

(c) $\cos A$

(d) $\cot A$

19. For what value of k, the system of equations $kx + 3y = 1$, $12x + ky = 2$ has no solution.

(a) $k = -6$

(b) $k \neq -6$

(c) $k = 4$

(d) $k = -4$

20. A die is thrown once. What is the probability of getting a number less than 3?

(a) $\frac{1}{3}$

(b) $\frac{1}{4}$

(c) $\frac{1}{2}$

(d) $\frac{1}{5}$

SECTION B

Section B consists of 20 questions of 1 mark each. Any 16 questions are to be attempted.

21. The traffic lights at three different road crossings change after every 48 seconds, 72 seconds and 108 seconds respectively. If they change simultaneously at 7 AM, at what time will they change simultaneously again?

(a) 7 min 12 sec (b) 8 min 12 sec

(c) 6 mni 24 sec (d) 9 min 24 sec

22. The co-ordinates of the vertices of ΔABC are $A(7,2)$, $B(9,10)$ and $C(1,4)$. If E and F are the mid-points of AB and AC respectively, then,

(a) $EF = \frac{1}{3}BC$ (b) $EF = \frac{1}{2}BC$

(c) $EF = BC$ (d) $EF = 2BC$

23. $\dfrac{\cos A}{1+\tan A} - \dfrac{\sin A}{1+\cot A} = ?$

(a) $\sin A - \cos A$ (b) $\sin A + \cos A$

(c) $\cos A - \sin A$ (d) $-\sin A - \cos A$

24. Two point A and B are 150 km apart on a highway. Two cars start from A and B at the same time. If they move in the same direction they meet in 15 hours. But if they move in the opposite direction, they meet in 1 hours.
Speed of the car starting form A is

(a) 50 kmph (b) 60 kmph

(c) 40 kmph (d) 80 kmph

25. A quadratic polynomial, whose zeroes are -3 and 4, is

(a) $x^2 - x + 12$ (b) $x^2 + x + 12$

(c) $\dfrac{x^2}{2} - \dfrac{x}{2} - 6$ (d) $2x^2 + 2x - 24$

26. What is the probability that a randomly taken leap year has 52 Sundays?

(a) $\frac{52}{365}$ (b) $\frac{5}{7}$

(c) $\frac{52}{366}$ (d) $\frac{53}{366}$

27. What is the probability that 5 Sundays occur in the month of November of a randomly selected year.

(a) $\frac{5}{7}$ (b) $\frac{2}{7}$

(c) $\frac{4}{7}$ (d) $\frac{3}{7}$

28. Meteorologists find the height of a cloud using an instrument called a ceilometer. It consists of a light projector that directs a vertical light beam up to the cloud base and a light detector that scans the cloud to detect the light beam.
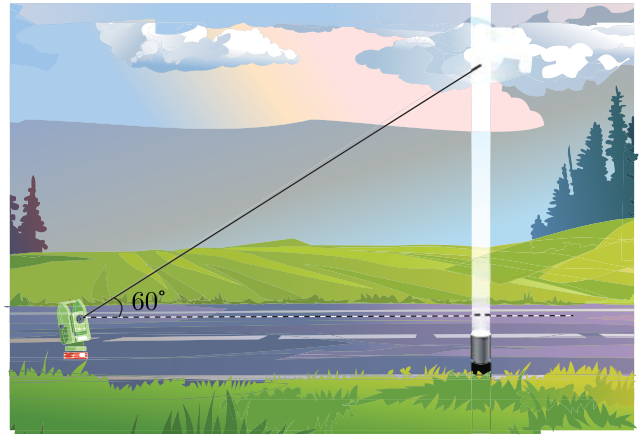
On July 2, 2021, at Midway Airport in Mumbai, a ceilometer was employed to find the height of the cloud cover. It was set up with its light detector 50 meter from its light projector. If the angle of elevation from the light detector to the base of the cloud was 60°, what was the height of the cloud cover?

(a) 140 m (b) 260 m

(c) 210 m (d) 180 m

29. The x-coordinate of a point P is twice its y-coordinate. If P is equidistant from $Q(2, -5)$ and $R(-3, 6)$, the co-ordinates of P will be

(a) $(4, 8)$ (b) $(16, 8)$

(c) $(8, 16)$ (d) $(8, 4)$

30. In $\Delta ABC, AD \perp BC$ and point D lies on BC such that $2DB = 3CD$. The term AB^2.

(a) $\frac{1}{5}AC^2 + BC^2$ (b) $AC^2 + \frac{1}{5}BC^2$

(c) $AC^2 + 5BC^2$ (d) $5AC^2 + BC^2$

31. What is the co-ordinates of the point where the line $2x - 3y - 5 = 0$ cuts the x-axis ?

(a) $\left(0, \frac{3}{2}\right)$ (b) $\left(\frac{3}{2}, 0\right)$

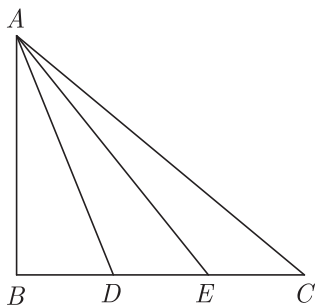(c) $\left(\frac{5}{2}, 0\right)$ (d) $\left(0, \frac{5}{2}\right)$

32. Given that $\tan(A + B) = \dfrac{\tan A + \tan B}{1 - \tan A \tan B}$, the value of $\tan 75°$ will be

(a) 0

(b) ∞

(c) $2 + \sqrt{3}$

(d) $2 - \sqrt{3}$

33. Select the smallest number which is divisible by both 306 and 657.

(a) 16498

(b) 22398

(c) 22338

(d) 16414

34. In the given figure, D and E trisect BC. The term $3AC^2 + 5AD^2$

(a) $2AE^2$ (b) $4AE^2$

(c) $6AE^2$ (d) $8AE^2$

35. The base BC of an equilateral triangle ABC lies on y-axis. The co-ordinates of point C are $(0,3)$. The origin is the mid-point of the base. What are the co-. Also find the co-ordinates of another point D such that $BACD$ is a rhombus.

(a) $(\sqrt{3}, 0)$ (b) $(2\sqrt{3}, 0)$

(c) $(3\sqrt{3}, 0)$ (d) $(4\sqrt{3}, 0)$

36. The length of the minute hand of a clock is 14 cm. What is the area swept by the minute hand from 9 a.m. to 9.35 a.m?

(a) $151.33\,\text{cm}^2$ (b) $296.33\,\text{cm}^2$

(c) $120.33\,\text{cm}^2$ (d) $259.33\,\text{cm}^2$

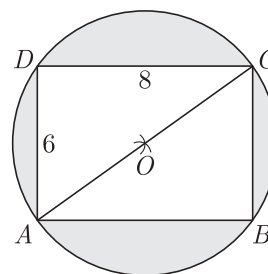**37.** What is the diameter of a circle whose area is equal to the sum of areas of two circles of diameter 16 cm and 12 cm?

(a) 10π cm (b) 20π cm

(c) 20 cm (d) 10 cm

38. Let β and $\frac{1}{\beta}$ are zeroes of the polynomial $(a^2 + a)x^2 + 61x + 6a$.
The value of a will be

(a) 2 (b) 4

(c) 5 (d) 7

39. What is the area of the shaded region in Figure, if $ABCD$ is a rectangle with sides 8 cm and 6 cm and O is the centre of circle? (Take $\pi = 3.14$)

(a) $10.5\,\text{cm}^2$ (b) $40.5\,\text{cm}^2$

(c) $20.5\,\text{cm}^2$ (d) $30.5\,\text{cm}^2$

40. A motor boat can travel 30 km upstream and 28 km downstream in 7 hours. It can travel 21 km upstream and return in 5 hours.
The speed of the boat in still water will be

(a) 10 km/hr (b) 4 km/hr

(c) 12 km/hr (d) 16 km/hr

SECTION C

Case study based questions:
Section C consists of 10 questions of 1 mark each. Any 8 questions are to be attempted.

Case Based Questions: (41-45)

The centroid is the centre point of the object. It is also defined as the point of intersection of all the three medians. The median is a line that joins the midpoint of a side and the opposite vertex of the triangle. The centroid of the triangle separates the median in the ratio of 2 : 1. It can be found by taking the average of x- coordinate points and y-coordinate points of all the vertices of the triangle.

See the figure given below
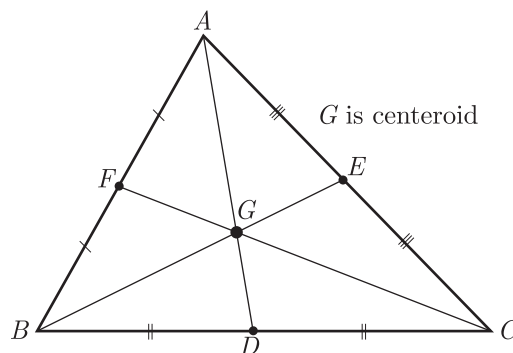
Here D, E and F are mid points of sides BC, AC and AB in same order. G is centroid, the centroid divides the median in the ratio 2 : 1 with the larger part towards the vertex. Thus $AG : GD = 2 : 1$
On the basis of above information read the question below.

If G is Centroid of $\triangle ABC$ with height h and J is centroid of $\triangle ADE$. Line DE parallel to BC, cuts the $\triangle ABC$ at a height $\frac{h}{4}$ from BC. $HF = \frac{h}{4}$.
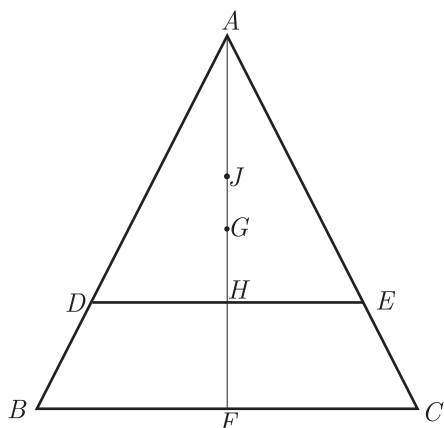
**41.** What is the length of AH ?

   (a) $\frac{h}{2}$ (b) $\frac{2h}{3}$

   (c) $\frac{3h}{4}$ (d) $\frac{h}{4}$

42. What is the distance of point A from point G?

   (a) $\frac{2AF}{3}$ (b) $\frac{3AF}{2}$

   (c) $\frac{AF}{3}$ (d) $\frac{AF}{2}$

43. What is the distance of point A from point J?

   (a) $\frac{2AG}{3}$ (b) $\frac{3AG}{4}$

   (c) $\frac{AG}{3}$ (d) $\frac{AG}{2}$

44. What is the distance GJ ?

   (a) $\frac{AG}{3}$ (b) $\frac{AG}{4}$

   (c) $\frac{2AG}{3}$ (d) $\frac{AG}{2}$

45. The area of a right angled triangle is 40 sq cm and its perimeter is 40 cm. The length of its hypotenuse is

   (a) 16 cm   (b) 18 cm

   (c) 17 cm   (d) data insufficient

Case Based Questions: (46-50)

The cost to produce bottled spring water is given by $C(x) = 16x - 63$ where x is the number of thousands of bottles. The total income (revenue) from the sale of these bottles is given by the function $R(x) = -x^2 + 326x - 7463$.

46. Since Profit $=$ Revenue $-$ Cost, the profit function would be

   (a) $-x^2 + 210x - 2400$ (b) $-x^2 + 210x - 7400$

   (c) $-x^2 + 310x - 7400$ (d) $-x^2 - 310x + 7400$

47. How many bottles sold will produce the maximum profit?

   (a) 125   (b) 155

   (c) 175   (d) 185

48. What is the maximum profit?

   (a) Rs 14625   (b) Rs 16625

   (c) Rs 22645   (d) Rs 14685

49. What is the profit when 245 thousand bottles are sold?

   (a) Rs 8525   (b) Rs 9225

   (c) Rs 12645   (d) Rs 10685

50. In given figure, the graph of a polynomial $p(x)$ is shown. The number of zeroes of $p(x)$ will be
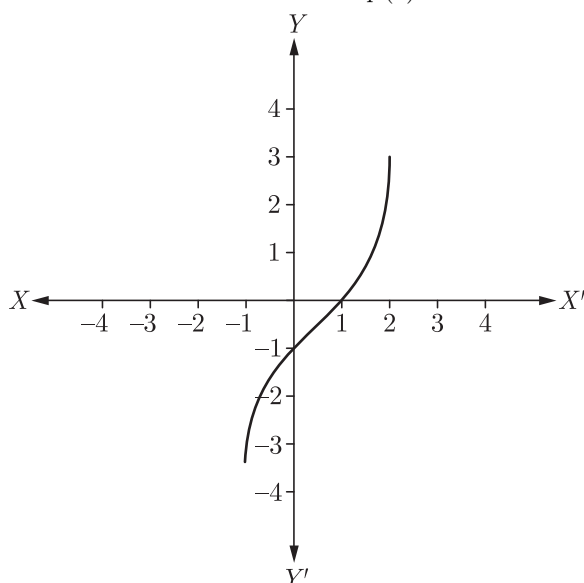
   (a) 1   (b) 2

   (c) 3   (d) 4

SAMPLE PAPER - 18 Answer Key

Paper Q. no.	Correct Option	Chapter no	Question Bank Q. no.
1	(b)	Ch-1	38
2	(a)	Ch-3	42
3	(c)	Ch-4	S-144
4	(b)	Ch-4	8
5	(d)	Ch-8	32
6	(b)	Ch-4	37
7	(d)	Ch-6	13
8	(c)	Ch-1	S-8
9	(b)	Ch-3	27
10	(b)	Ch-5	36
11	(a)	Ch-2	2
12	(a)	Ch-1	30
13	(a)	Ch-6	63
14	(a)	Ch-6	34
15	(a)	Ch-7	19
16	(c)	Ch-4	51
17	(a)	Ch-4	50
18	(b)	Ch-6	45
19	(a)	Ch-3	37
20	(a)	Ch-8	37
21	(a)	Ch-1	54
22	(b)	Ch-5	65
23	(c)	Ch-6	74
24	(d)	Ch-3	D-76
25	(c)	Ch-2	15

Paper Q. no.	Correct Option	Chapter no	Question Bank Q. no.
26	(b)	Ch-8	137
27	(b)	Ch-8	81
28	(c)	Ch-6	146
29	(b)	Ch-5	S-14
30	(b)	Ch-4	133
31	(c)	Ch-5	54
32	(c)	Ch-6	98
33	(c)	Ch-1	S-26
34	(d)	Ch-4	83
35	(c)	Ch-5	98
36	(b)	Ch-7	S-8
37	(c)	Ch-7	S-18
38	(c)	Ch-2	S-31(D)
39	(d)	Ch-7	S-28
40	(a)	Ch-3	D-90
41	(c)	Ch-4	115
42	(a)	Ch-4	116
43	(b)	Ch-4	117
44	(b)	Ch-4	118
45	(b)	Ch-4	4
46	(c)	Ch-2	71
47	(b)	Ch-2	72
48	(b)	Ch-2	73
49	(a)	Ch-2	74
50	(a)	Ch-2	30

* S- = Self Test Question, * D- = Direction Based Question