CLASS X (2020-21)
MATHEMATICS BASIC(241)
SAMPLE PAPER-4

Time : 3 Hours   **Maximum Marks : 80**

General Instructions :
1.   This question paper contains two parts A and B.
2.   Both Part A and Part B have internal choices.

Part–A :
1.   It consists of two sections- I and II.
2.   Section I has 16 questions. Internal choice is provided in 5 questions.
3.   Section II has four case study-based questions. Each case study has 5 case-based sub-parts. An examinee is to attempt any 4 out of 5 sub-parts.

Part–B :
1.   Question no. 21 to 26 are very short answer type questions of 2 mark each.
2.   Question no. 27 to 33 are short answer type questions of 3 marks each.
3.   Question no. 34 to 36 are long answer type questions of 5 marks each.
4.   Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.

PART - A

SECTION - I

Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.

Q1.   Find the LCM of smallest two digit composite number and smallest composite number.

Q2.   Find the quadratic polynomial, the sum of whose zeroes is -5 and their product is 6.

Q3.   Find whether the pair of linear equations $y = 0$ and $y = -5$ has no solution, unique solution or infinitely many solutions.

Q4.   Find the nature of roots of the quadratic equation $2x^2 - 3\sqrt{2}\,x + \frac{9}{4} = 0$

Q5.   Find the number of natural numbers between 102 and 998 which are divisible by 2 and 5 both.

OR

Is -150 a term of the AP 11, 8, 5, 2, ...?

Q6.   In $\triangle ABC$, $DE \parallel BC$, find the value of x.
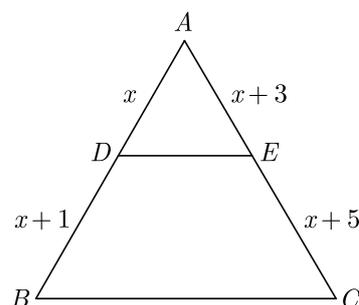
Q7. If the point $C(k,\ 4)$ divides the line segment joining two points $A(2,\ 6)$ and $B(5,1)$ in ratio $2:3$, the value of k is ....

OR

If points $A(-3,12)$, $B(7,6)$ and $C(x,9)$ are collinear, then the value of x is ....

Q8. The value of $(1+\tan^2\theta)(1-\sin\theta)(1+\sin\theta)=$ ....

Q9. A ladder 15 m long leans against a wall making an angle of 60° with the wall. Find the height of the point where the ladder touches the wall.

Q10. If a circle can be inscribed in a parallelogram how will the parallelogram change?

OR

What is the maximum number of parallel tangents a circle can have on a diameter?

Q11. In figure, $\triangle ADE$ is constructed similar to $\triangle ABC$, write down the scale factor.
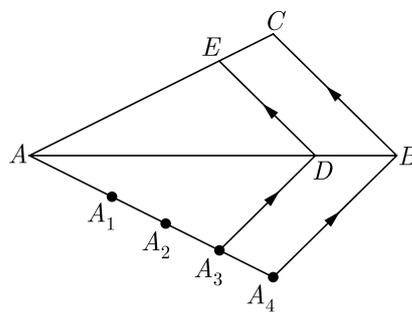
Q12. The diameter of a sphere is 6 cm. It is melted and drawn into a wire of diameter 2 mm. What is the length of the wire?

Q13. The mean weight of 9 students is 25 kg. If one more student is joined in the group the mean is unaltered, then find the weight of the 10th student.
    (a) 25 kg   (b) 24 kg
    (c) 26 kg   (d) 23 kg

OR

The mean and median of the data a, b and c are 50 and 35 respectively, where $a<b<c$. If $c-a=55$, then find the value of $(b-a)$.

Q14. A girl calculates that the probability of her winning the first prize in a lottery is 0.08. If 6000 tickets are sold, then how many tickets has she bought?
    (a) 40   (b) 240
    (c) 480   (d) 750

OR

One ticket is drawn at random from a bag containing tickets numbered 1 to 40. Find the probability that the selected ticket has a number which is a multiple of 5.

Q15. In the given figure, if $AD = 7\sqrt{3}$ m, then find the value of BC.
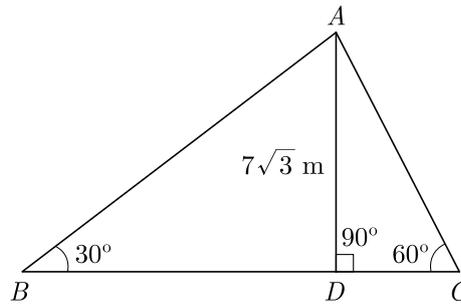
Q16. Three solid metallic spherical balls of radii 3 cm, 4 cm and 5 cm are melted into a single spherical ball, find its radius.

SECTION II

Case study-based questions are compulsory. Attempt any 4 sub parts from each question. Each question carries 1 mark.

Q17. Auditorium, the part of a public building where an audience sits, as distinct from the stage, the area on which the performance or other object of the audience's attention is presented. In a large theatre an auditorium includes a number of floor levels frequently designed as stalls, private boxes, dress circle, balcony or upper circle, and gallery. A sloping floor allows the seats to be arranged to give a clear view of the stage. The walls and ceiling usually contain concealed light and sound equipment and air extracts or inlets and may be highly decorated.

In an auditorium, seats are arranged in rows and columns. The number of rows are equal to the number of seats in each row. When the number of rows are doubled and the number of seats in each row is reduced by 10, the total number of seats increases by 300.

(i) If x is taken as number of row in original arrangement which of the following quadratic equation describes the situation ?
(a) $x^2 - 20x - 300 = 0$ (b) $x^2 + 20x - 300 = 0$
(c) $x^2 - 20x + 300 = 0$ (d) $x^2 + 20x + 300 = 0$

(ii) How many number of rows are there in the original arrangement?
(a) 20   (b) 40
(c) 10   (d) 30

(iii) How many number of seats are there in the auditorium in original arrangement ?
(a) 725   (b) 400
(c) 900   (d) 680

(iv) How many number of seats are there in the auditorium after re-arrangement.
(a) 860   (b) 990
(c) 1200   (d) 960

**(v)** How many number of columns are there in the auditorium after re-arrangement?
  (a) 42   (b) 20
  (c) 25   (d) 32

Q18. Rani wants to make the curtains for her window as shown in the figure. The window is in the shape of a rectangle, whose width and height are in the ratio $2:3$. The area of the window is 9600 square cm.

(i) What is the shape of the window that is uncovered?
  (a) Right triangle   (b) Equilateral triangle
  (c) Isosceles triangle   (d) Rectangle

(ii) What will be the ratio of two sides of each curtain (other than hypotenuse) ?
  (a) 1 : 3   (b) 2 : 3
  (c) 1 : 1   (d) 3 : 2

(iii) What are the dimensions of the window ?
  (a) 40 cm × 80 cm   (b) 20 cm × 60 cm
  (c) 80 cm × 120 cm   (d) 40 cm × 120 cm

(iv) What will be the perimeter of the window ?
  (a) 200 cm   (b) 100 cm
  (c) 400 cm   (d) 450 cm

(v) How much window area is covered by the curtains?
  (a) 50 %   (b) 75 %
  (c) 25 %   (d) 80 %

Q19. A barn is an agricultural building usually on farms and used for various purposes. A barn refers to structures that house livestock, including cattle and horses, as well as equipment and fodder, and often grain.
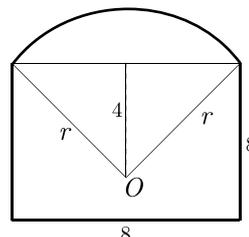
Ramkaran want to build a barn at his farm. He has made a design for it which is shown above. Here roof is arc of a circle of radius r at centre O.

(i) What is the value of radius of arc ?

(a) $4\sqrt{3}$ m   (b) $4\sqrt{2}$ m

(c) $4\sqrt{3}$ m   (d) $2\sqrt{2}$ m

(ii) What is the curved width of roof ?

(a) $2\pi\sqrt{3}$ m   (b) $4\pi\sqrt{2}$ m

(c) $2\pi\sqrt{2}$ m   (d) $4\pi\sqrt{3}$ m

(iii) What is area of cross section of barn ?

(a) $8(6+\pi)\,\text{m}^2$ (b) $4(6+\pi)\,\text{m}^2$

(c) $8(3+\pi)\,\text{m}^2$ (d) $4(3+\pi)\,\text{m}^2$

(iv) If the length of the barn is 12 meters, what is the curved surface area of roof?

(a) $32\sqrt{2}\,\pi\,\text{m}^2$ (b) $16\sqrt{2}\,\pi\,\text{m}^2$

(c) $48\sqrt{2}\,\pi\,\text{m}^2$ (d) $24\sqrt{2}\,\pi\,\text{m}^2$

(v) What is the storage capacity of barn ?

(a) $48(6+\pi)\,\text{m}^3$ (b) $48(6+\pi)\,\text{m}^3$

(c) $96(6+\pi)\,\text{m}^3$ (d) $96(3+\pi)\,\text{m}^3$

Q20. Amul, is an Indian dairy cooperative society, based at Anand in the Gujarat. Formed in 1946, it is a cooperative brand managed by a cooperative body, the Gujarat Co-operative Milk Marketing Federation Ltd. (GCMMF), which today is jointly owned by 36 lakh (3.6 million) milk producers in Gujarat. Amul spurred India's White Revolution, which made the country the world's largest producer of milk and milk products.

Survey manager of Amul dairy has recorded monthly expenditures on milk in 100 families of a housing society. This is given in the following frequency distribution :

Monthly expenditure (in Rs.)	Number of families
0-175	10
175-350	14
350-525	15
525-700	x
700-875	28
875-1050	7
1050-1225	5

(i) How many families spend between Rs 350-700 on milk ?
(a) 21   (b) 38
(c) 17   (d) 36

(ii) What is the upper limit of median class ?
(a) 1225   (b) 875
(c) 1050   (d) 700

(iii) What is the median expenditure on milk?
(a) 601.4   (b) 636.5
(c) 616.6   (d) 624.5

(iv) What is the lower limit of model class ?
(a) 1225   (b) 875
(c) 1050   (d) 700

(v) What is the model expenditure on milk?
(a) 734.25   (b) 743.75
(c) 801.25   (d) 820.25

PART - B

All questions are compulsory. In case of internal choices, attempt anyone.

Q21.   Given that HCF $(306, \ 1314) = 18$. Find LCM $(306, \ 1314)$.   [2]

OR

Check whether $(15)^n$ can end with digit 0 for any $n \in N$.

Q22.   For what value of k, the pair of linear equations $kx - 4y = 3$, $6x - 12y = 9$ has an infinite number of solutions ?

OR

For what value of k, $2x + 3y = 4$ and $(k+2)x + 6y = 3k + 2$ will have infinitely many solutions ?

Q23.   Prove that the point $(3,0)$, $(6,4)$ and $(-1,3)$ are the vertices of a right angled isosceles triangle.

Q24.   If $\cos(A - B) = \frac{\sqrt{3}}{2}$ and $\sin(A + B) = \frac{\sqrt{3}}{2}$, find $\sin A$ and B, where $(A + B)$ and $(A - B)$ are acute angles.

Q25.   From a point P on the ground the angle of elevation of the top of a 10 m tall building is $30°$. A flag is hoisted at the top the of the building and the angle of elevation of the length of the flagstaff from P is $45°$. Find the length of the flagstaff and distance of building from point P. [Take $\sqrt{3} = 1.732$]

Q26.   The mode of the following frequency distribution is 36. Find the missing frequency f.

| Class	0- 10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	8	10	f	16	12	6	7

Q27.   Prove that $2 + 5\sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is an irrational number.   [3]

OR

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

Q28.   The Present age of the father is twice the sum of the ages of his 2 children. After 20 years, his age will be equal to the sum of the ages of his children. Find the age of the father.

Q29.   Determine an AP whose third term is 9 and when fifth term is subtracted from 8th term, we get 6.

Q30.   Find the ratio in which the line segment joining the points $A(3, -3)$ and $B(-2, 7)$ is divided by x -axis. Also find the co-ordinates of point of division.

Q31.   Draw two concentric circles of radii 2 cm and 5 cm. Take a point P on the outer circle and construct a pair of tangents PA and PB to the smaller circle. Measure PA.

Q32.   A tent is in the shape of cylinder surmounted by a conical top of same diameter. If the height and diameter of cylindrical part are 2.1 m and 3 m respectively and the slant height of conical part is 2.8 m, find the cost of canvas needed to make the tent if the canvas is available at the rate of Rs.500 per square meter. Use $\pi = \frac{22}{7}$.
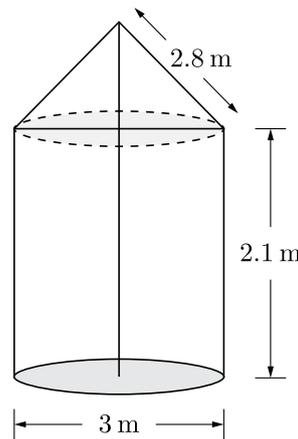
Q33.   Five cards, ten, Jack, Queen, King and Ace of diamonds are well shuffled. One card is picked up from them.
(i) Find the probability that the drawn card is Queen.
(ii) If Queen is put aside, then find the probability that the second card drawn is an ace.

OR

A box contains cards, number 1 to 90. A card is drawn at random from the box. Find the probability that the selected card bears a :
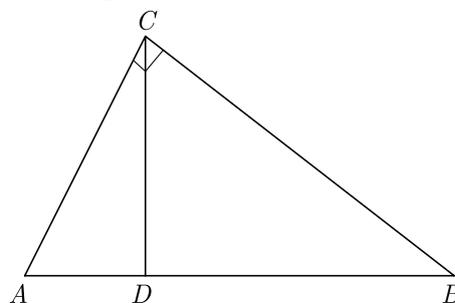(i) Two digit number.   (ii) Perfect square number

Q34.   If α and β are zeroes of the polynomial $p(x) = 6x^2 - 5x + k$ such that $\alpha - \beta = \frac{1}{6}$, Find the value of k.

OR

If β and $\frac{1}{\beta}$ are zeroes of the polynomial $(a^2 + a)x^2 + 61x + 6a$. Find the value of β and α.

Q35.   In Figure , $\angle ACB = 90°$ and $CD \perp AB$, prove that $CD^2 = BD \times AD$.

Q36.   If $\tan A + \sin A = m$ and $\tan A - \sin A = n$, show that $m^2 - n^2 = 4\sqrt{mn}$.

Download solved version of this paper from www.cbse.online
****