(POLYNOMIALS)

SECTION A
(CONCEPTUAL BASED MCQS)

Choose the correct answer from the given four options in the following questions.

1. The number of zeroes of the given polynomial, $(x+1)^2(x+2)(x-3)$ is
   (a) 2   (b) 3   (c) 4   d) 1

2. The zeroes of the polynomial $x^2 -3x – m(m+3)$ are
   (a) m, m +3   (b) -m, m+3   (c) m, -(m + 3) (d) -m, -(m + 3)

3. If one of the zeroes of the quadratic polynomial $(k-1) x^2+ k x + 1$ is -3, then the Value of k is
   (a) $\frac{4}{3}$ (b) $\frac{-4}{3}$ (c) $\frac{2}{3}$ (d) $\frac{-2}{3}$

4. If α and β are zeroes of the polynomial $f(x) = x^2- x - 4$, then the value of $(\frac{1}{\alpha})+(\frac{1}{\beta})-\alpha\beta$
   (a) $\frac{15}{4}$ (b) $\frac{-15}{4}$ (c) 4   (d) 15

5. The value of the polynomial $x^8– x^5+ x^2- x + 1$ is
   (a) Positive for all the real numbers   (b) Negative for all the real numbers.
   (c) O   (d) depends on value of x.

6. If the zeroes of the quadratic polynomial $x^2+ (a + 1) x + b$ are 2 and -3, then
   (a) a= -7, b = -1   (b) a = 5, b = -1   (c) a = 2, b = -6   (d) a = 0, b = -6

7. Given that one of the zeroes of the cubic polynomial $a x^3 + b x^2 + cx + d$ is zero, the product of the other two zeroes is
   (a) $\frac{-c}{a}$ (b) $\frac{c}{a}$ (c) 0   (d) $\frac{b}{a}$

8. The graph of the polynomial $ax^2+ bx + c$ is an upward parabola if
   (a) a>0   (b) a< 0   (c) a = 0   (d) none

9. If a-b, a and (a + b) are zeroes of the polynomial $f(x) = 2x^3 – 6x^2+ 5x - 7$, then the value of a is
   (a) 1   (b) 2   (c) -5   (d) 7

10. If one of the zeroes of a quadratic polynomial of the form $x^2+ ax + b$ is the negative of the other, then it
    (a) has no linear term and the constant term is negative.
    (b) has no linear term and the constant term is positive.
    (c) can have a linear term but the constant term is negative.
    (d) can have a linear term but the constant term is positive.

11. $x^2 – ax^3+ bx^2- cx + 8 = 0$ divided by (x -1) leaves a remainder of 4, divided by (x + 1) leaves a remainder 3, then b =
    (a) 2.5   (b) -5.5   (c) 3.5   (d) 6.5

12. On dividing $x^3– 3x^2+ x + 2$ by a polynomial g(x), the quotient and remainder were (x - 2) and (-2x + 4) respectively, then g(x) is equal to
    (a) $x^2+ x +1$ (b) $x^2+ 1$ (c) $x^2- x + 1$ (d) $x^2– 1$

13. A quadratic polynomial when divided by (x + 2), leaves a remainder of 1 and when divided by (x – 1), leaves a remainder of 4. What will be the remainder if it is divided by (x + 2)(x - 1)?
    (a) 1   (b) 4   (c) x +3   (d) x – 3

14. The polynomial $f(x) = ax^3 + bx - c$ is divisible by the polynomial $g(x) = x^2 + bx + c$, $c \neq 0$ if
(a) $ab = 2$ (b) $ab = 1$ (c) $ac = 2$ (d) $c = 2b$

15. If a cubic polynomial with sum of its zeroes, sum of the product of its zeroes taken two at a time, and product of its zeroes as 2, -5 and -11 respectively, then the cubic polynomial is
(a) $x^3 - 2x^2 - 5x - 11$ (b) $x^3 + 2x^2 - 5x - 11$ (c) $x^3 + 2x^2 - 5x + 11$ (d) $x^3 - 2x^2 - 5x + 11$

16. If α and β are the zeroes of the quadratic polynomial $f(x) = ax^2 + bx + c$, then the value of $\alpha^4 + \beta^4$ is
(a) $\dfrac{(b^2 - 2ac)^2 + a^2c^2}{a^4}$ (b) $\dfrac{(b^2 + 2ac)^2 + a^2c^2}{a^4}$ (c) $\dfrac{(b^2 - 2ac)^2 - 2a^2c^2}{a^4}$ (d) $\dfrac{(b^2 + 2ac)^2 + 2a^2c^2}{a^4}$

17. If the polynomial $x^4 - 6x^3 + 16x^2 - 25x + 10$ is divided by another polynomial $x^2 - 2x + k$, The remainder comes out to be $x + a$, then $k =$ _____ $a =$ _____ .
(a) 5, -5   (b) -5, 5   (c) 0, 5   (d) 5, 0

18. A quadratic of polynomial, whose zeroes are 5 and -8 is
(a) $x^2 + 13x - 40$ (b) $x^2 + 4x - 3$ (c) $x^2 - 3x + 40$ (d) $x^2 + 3x - 40$

19. The number of polynomials having zeroes as -2 and 5 is
(a) 1   (b) 2   (c) 3   (d) more than 3

20. If 2 and α are zeroes of $x^2 - 3x + 2$, then the value of α is
(a) 2   (b) 3   (c) 1   (d) 5

21. If one of the zeroes of the cubic polynomial $x^3 + px^2 + qx + r$ is -1, then the product of the other two zeroes is
(a) $p + q + 1$ (b) $p - q - 1$ (c) $q - p + 1$ (d) $q - p - 1$

22. Given that two of the zeroes of the cubic polynomial $ax^3 + bx^2 + cx + d$ are 0, the value of c is
a) less than 0   b) greater than 0   c) equal to 0   d) can't say.

Answers: -

| 1 (c)	2(b)	3 (a)	4 (a)	5 (a)	6 (d)	7 (b)
8 (a)	9 (a)	10 (a)	11 (b)	12 (c)	13(c)	14 (b)
15 (d)	16 (c)	17 (a)	18(d)	19(d)	20(c)	21(c)
22(c)						

SECTION B
(CASE STUDY BASED QUESTIONS)

1. A child was flying a kite, its string got struck into a tree and touched ground as shown in figure

i. The string of the kite represents the graph of a
   (a) Linear polynomial   **(b)** Quadratic polynomial
   (c) Cubic polynomial   **(d)** Constant polynomial

ii. The number of zeroes of a quadratic polynomial is
   (a) 1   **(b)** utmost 2   **(c)** 3   **(d)** none of the above.

iii. If the zeroes of polynomial $x^2-12x+(3k-1)$ is five times the other then k is
   (a) 2   **(b)** 3   **(c)** 10   **(d)** 7

2. The below pictures are few natural examples of parabolic constructions which are represented by a quadratic polynomial. A parabolic arch is an arch in the shape of a parabola in structures; their curve represents an efficient method of load and so can be found in bridges and in architecture in a variety of forms.
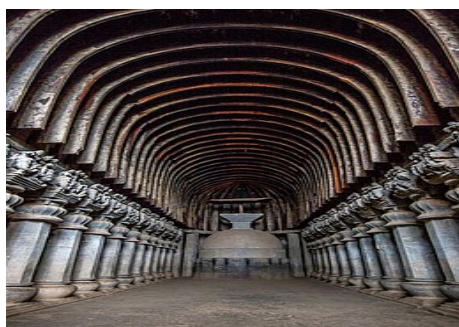

i. In the standard form of quadratic polynomial ax^2+bx+c where a,b and c are
   (a) All are real   **(b)** All are rational numbers.
   (c) a is a non-zero real number and b and c are any real numbers.   **(d)** All are integers

ii. If the roots of the quadratic polynomial are equal then
   (a) $a^2=bc$ **(b)** a=b **(c)** b=c **(d)** $b^2=4ac$

iii. If the sum of the roots is –p and product of the roots is -1/p then the quadratic polynomial is
   (a) $k(-px^2+\frac{x}{p}+1)$ **(b)** $k(-px^2-\frac{x}{p}-1)$ **(c)** $k(x^2+px-\frac{1}{p})$*   **(d)** $k(x^2-px+\frac{1}{p})$

3. Newtonian mechanics demonstrates that the displacement of an object in free fall is given by the relation $s = ut + \frac{1}{2}at^2$, where s is the displacement, u is the initial velocity, a is the acceleration, and t is the time. This displacement equation is a polynomial expression. Polynomials enable people to describe the physical world.
i. For example, assume that a ball is released from rest at the top of a building measuring 8.52 meters tall. How long does it take for that ball to reach the ground?
   (a) 1.23 seconds   **(b)** 9.8 seconds   **(c)** 1.32 seconds   **(d)** 32 minutes
ii. Which is the true statement
   (a) If time increases the displacement increases.
   (b) If time decreases the displacement increases.
   (c) Time is not changing, but displacement is happening.
   **(d)** None of the above.

4. HONEYCOMB: While playing in the mango garden Sudhir saw honeycomb and asked his father about that. His father replied that A honeycomb is a mass of hexagonal prismatic wax cells built by honey bees in their nests to contain their larvae and stores of honey and pollen.
Beekeepers may remove the entire honeycomb to harvest honey. Honey bees consume about 8.4 lb (3.8 kg) of honey to secrete 1 lb (450 g) of wax and so beekeepers may return the wax to the hive after

harvesting the honey to improve honey outputs. The structure of the comb may be left basically intact when honey is extracted from it by uncapping and spinning in a centrifugal machine, more specifically a honey extractor. His father told that honeycomb formed is parabolic. The mathematical representation of the honeycomb structure is shown in the graph.
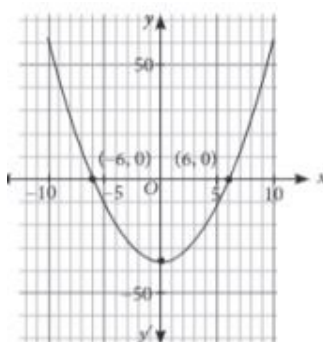

i. Graph of the quadratic polynomial is _____ in shape.
   (a) Straight line   **(b)** Parabola   **(c)** Circular   **(d)** None of the above.

ii. The expression of the polynomial represented by the graph is
   (a) x^2-49 **(b)** x^2-64 **(c)** x^2-36 **(d)** x^2-81

iii. find the value of the polynomial when x=3
   (a) 27   **(b)** -27   **(c)** 36   **(d)** none of the above.

iv. The product of the zeroes of the polynomial $7x^2-3x+4$ is
   (a) $-\dfrac{3}{7}$ **(b)** $\dfrac{4}{7}$ **(c)** $-\dfrac{4}{7}$ **(d)** $\dfrac{3}{7}$

5.   A metalworker makes an overflow pan by cutting equal squares with sides of length x from the corners of a 30 cm by 20 cm piece of aluminium, as shown in the figure. The sides are then folded up and the corners sealed. Drain pans aren't a requirement for your washer, but they are an inexpensive and simple way of protecting your home by catching small leaks and reducing the amount of water damage from broken hoses. If your laundry room is upstairs, a drain pan is recommended to protect against leaks that can seep into the rooms below.
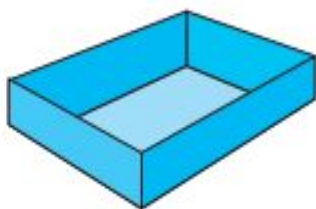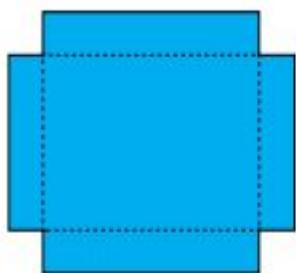
i. Which of the following polynomial function V (x) gives the volume of the pan?
   (a) $4x^3-60x^2+450x$ **(b)** $4x^3-100x^2+600x$ **(c)** $4x^3-65x^2+600x$ **(d)** $4x^3-60x^2+500x$

ii. What is volume of the pan if the height is 6 cm?
   (a) 518 cm^3 **(b)** 746 cm^3 **(c)** 648 cm^3 **(d)** 864 cm^3

6.   FACOR, VIZIANAGARAM has got an order for making a frame for machine of their client. For which, they are using a AutoCAD software to create a constructible model that includes the relevant information such as dimensions of the frame and materials needed The frame will have a solid base and

will be cut out of a piece of steel. The final area of the frame should be 54 m². The diagram of frame is shown below
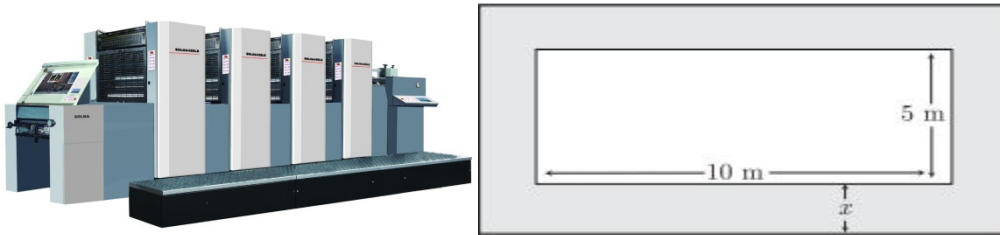

AutoCAD is a commercial computer-aided design (CA**D)** and drafting software application. Developed andmarketed by Autodesk, AutoCAD was first released in December 1982 as a desktop app running on microcomputers with internal graphics controllers. Before AutoCAD was introduced, most commercial CAD programs ran on mainframe computers or minicomputers, with each CAD operator (user) working at a separate graphics terminal. AutoCAD is also available as mobile and web apps.

In order to input the right values in the AutoCAD software, the engineer needs to calculate some basic values
Answer the questions:

   i. What are the dimensions of the outer frame?
   (a) $10 + x$ and $5 + x$ **(b)** $10 - x$ and $5 - x$ **(c)** $10 + 2x$ and $5 + 2x$ **(d)** $10 - 2x$ and $5 - 2x$

   ii. A metal sheet of minimum area is used to make the frame. What should be the minimum area of metal sheet before cutting?
   (a) $4x^2 + 30x + 50$ **(b)** $x^2 + 27x + 55$ **(c)** $5x^2 + 30$ **(d)** $4x^2 + 50$

7.   In a soccer match, the path of the soccer ball in a kick is recorded as shown in the following graph.
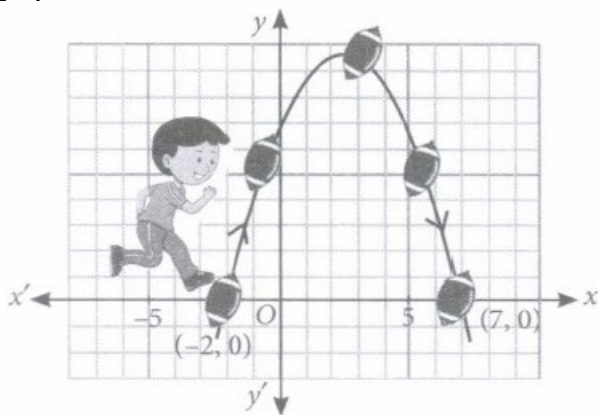
Based on the above information of the above information, answer the following questions:
   i. The shape of path of the soccer ball is a
   (a) Circle   **(b)** Parabola   **(c)** Line   **(d)** None of the these

   ii. The axis of symmetry of the given parabola is
   (a) y-axis   **(b)** x-axis   **(c)** Line parallel to y-axis   **(d)** Line parallel to y-axis.

   iii. The zeroes of the polynomial, represented in the given graph, are
   (a) (-1, 7)   **(b)** (5, -2)   **(c)** (-2, 7)   **(d)** (-3, 8)

   iv. Which of the following polynomial has -2 and -3 as its zeroes
   (a) $x^2 - 5x - 5$ **(b)** $x^2 + 5x - 6$ **(c)** $x^2 + 6x - 5$ **(d)** $x^2 + 5x + 6$

   v. For what value of 'x', the value of the polynomial $f(x) = (x-3)^2 + 9$ is 9?
   (a) 1   **(b)** 2   **(c)** 3   **(d)** 4

8.   While playing badminton in the park Raju seeing the barrier chains hung between two posts at the edge of the walk way of a street. It is hung in the shape of the parabola. Parabola is the graphicalrepresentation of a particular type of polynomial.

i.   Which of the following polynomial is graphically represented by a parabola
    (a) Linear polynomial   **(b)** Quadratic polynomial
    (c) Cubic polynomial   **(d)** None of the above.

ii.   If a polynomial, represented by a parabola, intersects the X-axis at -3, 4 and Y-axis at -2 then itszero(es) is/are
    (a) -1,2 and -2   **(b)** 2 and -2   **(c)** -1   **(d)** -3 and 4

Answers: -

1 (i) (a)	1 (ii) (b)	1 (iii) (d)	2 (i) (c)	2 (ii) (d)	2 (iii) (c)	3 (i) (c)
3 (ii) (a)	4 (i) (b)	4 (ii) (c)	4 (iii) (b)	4 (iv) (b)	5 (i) (b)	5 (ii) (d)
6 (i) (c)	6 (ii) (a)	6 (iii) (b)	7 (i) (b)	7 (ii) (c)	7 (iii) (c)	7 (iv) (d)
7 (v) (c)	8 (i) (b)	8 (ii) (d)				