

UNIT - I

Time: 3 hour
M. M. 80

BVP/X/Mathematics/2024-25

General Instructions:

1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 01 mark each.
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub- parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Questions of 5 marks, 2 Questions of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.

Section A

Section A consists of 20 questions of 1 mark each.

1. If p and q are natural numbers and p is the multiple of q, then the HCF of p and q is
a) pq b) p c) q d) p+q
2. If one of the zeroes of the quadratic polynomial $(k-1)x^2 + kx + 1$ is -3, then the value of k is
a) $\frac{4}{3}$ b) $\frac{-4}{3}$ c) $\frac{2}{3}$ d) $\frac{-2}{3}$
3. If sum of zeroes of a polynomial is $-\frac{1}{6}$ and product of the zeroes of the polynomial is -2, then the polynomial is
a) $x^2 - \frac{1}{6}x + 2$ b) $x^2 - \frac{1}{6}x - 2$ c) $6x^2 - x + 12$ d) $6x^2 + x - 12$
4. Find the value of k for which the system of equations $kx - y = 4$, $10x - 2y = 3$ has no solution.
a) 6 b) 4 c) 5 d) 2
5. The probability of getting a prime number, when a die is thrown once, is
a) $\frac{1}{2}$ b) $\frac{1}{3}$ c) $\frac{1}{6}$ d) $\frac{5}{6}$
6. If $\tan \theta = \sqrt{3}$, then find the value of $\sin \theta \cos \theta$.
a) $\frac{\sqrt{3}}{2}$ b) $\sqrt{3}$ c) $\frac{\sqrt{3}}{4}$ d) $\frac{1}{\sqrt{3}}$
7. Three coins are tossed simultaneously, the probability of getting atmost one tail is
a) $\frac{3}{8}$ b) $\frac{1}{2}$ c) $\frac{5}{8}$ d) $\frac{3}{4}$
8. If $\text{HCF}(26, 169) = 13$, then $\text{LCM}(26, 169)$ equal to

- a) 26 b) 52 c) 338 d) 13

9. An event is very unlikely to happen. Its probability is closest to

- a) 0.0001 b) 0.001 c) 0.01 d) 0.1

10. If $2\sin 2\theta = \sqrt{3}$, then θ is equal to

- a) 30° b) 45° c) 60° d) None of these

11. The polynomial having zeroes as -2 and 5, is

- a) $x^2 - 5x - 10$ b) $x^2 + 3x + 10$ c) $x^2 + 3x - 10$ d) $x^2 - 3x - 10$

12. The value of $\sin^2 30^\circ + \cos^2 30^\circ$ equals

- a) 0 b) 1 c) $\frac{1}{2}$ d) $\frac{2}{3}$

13. The pair of equations $x + 2y + 5 = 0$ and $-3x - 6y + 1 = 0$ have

$-13 + 8 + 5 = 0$
 $-3 \times 3 + 2 \times 1 = -9 + 2 = -7 \neq 0$

- a) a unique solution b) exactly two solutions c) infinitely many solutions d) no solution

14. The exponent of 2 in the prime factorisation of 720, is

- a) 3 b) 4 c) 5 d) 6

15. The system of equations $a_1x + b_1y = c_1$ and $a_2x + b_2y = c_2$ has unique solution, if

- a) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ b) $\frac{a_1}{a_2} = \frac{b_1}{b_2}$ c) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ d) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

16. The roots of quadratic equation $2x^2 - x - 6 = 0$ are

- a) $-2, \frac{3}{2}$ b) $2, \frac{-3}{2}$ c) $-2, \frac{-3}{2}$ d) $2, \frac{3}{2}$

$2x^2 - x - 6 = 0$
 $\frac{1}{2}x^2 - \frac{1}{4}x - 3 = 0$
 $\frac{1}{2}x^2 - \frac{1}{4}x + \frac{3}{2} - \frac{3}{2} = 0$
 $\frac{1}{2}x^2 - \frac{1}{4}x + \frac{3}{2} - \frac{3}{2} = 0$
 $\frac{1}{2}x^2 - \frac{1}{4}x + \frac{3}{2} - \frac{3}{2} = 0$

17. The quadratic equations whose roots are real and equal is

- a) $2x^2 - 4x + 3 = 0$ b) $x^2 - 4x + 4 = 0$ c) $3x^2 - 5x + 2 = 0$ d) $x^2 - 2\sqrt{2}x - 6 = 0$

18. If the equation $ax^2 + 2x + a = 0$ has two distinct real roots, then

- a) $D > 0$ b) $D < 0$ c) $D = 0$ d) none of these

$\frac{1}{4} + \frac{3}{4}$

DIRECTION: In the question number 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct option.

19. Statement A (Assertion): $4x^2 - 12x + 9 = 0$ has repeated roots.

Statement R (Reason): The quadratic equation $ax^2 + bx + c = 0$ have repeated roots if $D > 0$.

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

20. Statement A (Assertion): Consider a pack of cards that are numbered from 1 to 52. If a card is drawn at random from the pack, then the probability that it will have a prime number is $\frac{7}{26}$.

Statement R (Reason): From 1 to 52, there are 15 prime numbers.

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true.

Section - B

Section B consists of 5 questions of 2 marks each.

21. Check whether 14^n can end with digit 0 for any natural number n .

Or

Take any two numbers of two digits of your choice and find the HCF and LCM of these numbers by prime factorisation method.

22. For what values of p the equation $9x^2 - 3(p-1)x + (p-1) = 0$ has real and equal roots?

23. If the product of zeroes of the quadratic polynomial $f(x) = (k-2)x^2 - 4x + k$ is 3, then find the value of k .

24. If $\sin(A+B) = 1$ and $\sin(A-B) = \frac{1}{2}$, where $0^\circ \leq A+B \leq 90^\circ$ and $A > B$, then find A and B .

Or

Solve: $\cos^2 30^\circ + \sin^2 45^\circ - \frac{1}{3} \tan^2 60^\circ + \cos 90^\circ$

25. Solve for x and y :

$$4x - y = 5$$

$$2x - y = 3$$

Section - C

Section C consists of 6 questions of 3 marks each.

26. Prove that $\sqrt{5}$ is an irrational number.

27. If α and β are the zeroes of the polynomial $p(x) = 2x^2 - 5x + 3$. Then find a quadratic polynomial whose zeroes are $\frac{1}{\alpha^2}$ and $\frac{1}{\beta^2}$.

Or

Obtain the zeroes of the quadratic polynomial $\sqrt{3}x^2 - 8x + 4\sqrt{3}$ and verify the relationship between zeroes and coefficients.

28. The sum of the digits of a two digit number is 9. Also, nine times this number is twice the number obtained by reversing the order of the digits. Find the number.

Or

Five years hence, the age of Jacob will be three times that of his son. Five years ago, Jacob's age was seven times that of his son. What are their present ages?

29. Find two consecutive positive integers, the sum of whose squares is 365.

30. One card is drawn from a well shuffled deck of 52 cards. Find the probability of getting:

(a) A face card (b) a king of black colour (c) a jack

31. If $\tan \theta = \frac{1}{\sqrt{3}}$, find the value of $7 \sin^2 \theta + 3 \cos^2 \theta$.

Section - D

Section D consists of 4 questions of 5 marks each.

32. Two lines $3x + 5y = 15$, $6x - 5y = 30$ and y -axis 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 metres.

33. A train travels 360 km at a uniform speed. If the speed had been 5 km/h more, it would have taken 1 hour less for the same journey. Find the speed of the train.

Or

The difference of squares of two natural numbers is 45. The square of smaller number is four times the larger number. Find the numbers.

34. Two dice are thrown simultaneously. What is the probability of

(a) Both dice showing same results?

(b) 3 will not come up either time?

(c) 3 will come up at least once?

35. In ΔPQR , right angled at Q, $PR + QR = 25$ cm and $PQ = 5$ cm. Determine the values of $\sin P$, $\cos P$ and $\tan P$.

Or

In triangle ABC. Right angled at B, if $\tan A = \frac{1}{\sqrt{3}}$, find the value of :

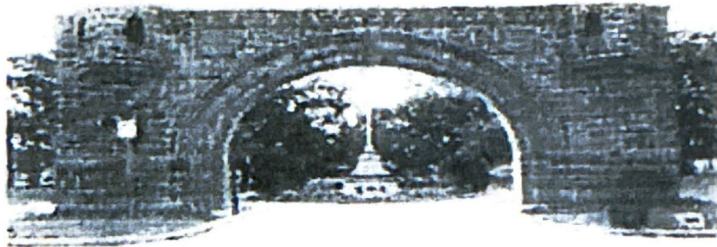
(a) $\sin A \cos C + \cos A \sin C$

(b) $\cos A \cos C - \sin A \sin C$

Section - E

Case study based questions are compulsory.

36. Quadratic polynomial can be used to model the shape of many architectural structures in the world.



Use the above information to answer the questions that follow:

(a) Find the product of zeroes of the polynomial $\sqrt{3}x^2 - 14x + 8\sqrt{3}$.

(b) Find the sum of zeroes of the polynomial $\sqrt{3}x^2 - 14x + 8\sqrt{3}$.

(c) If the Arch is represented by $10x^2 - x - 3$, then find its zeroes.

Or

Find the quadratic polynomial whose sum of zeroes is 0 and product of zeroes is 1.

37. Sunil goes to market for buying an aquarium for his house. He asked to the shopkeeper to put some fish in the aquarium. The shopkeeper takes out 15 guppy fish, 19 flowerhorn fish, 17 koi fish and 11 angel fish from the big tank he had and put them in the aquarium that Sunil had bought. Now, he selects a fish at random.



Use the above information to answer the questions that follow:

- (a) If total number of male fish in the aquarium is 31, then find the probability of selecting a female fish.
- (b) Find the probability of selecting a flowerhorn fish.
- (c) Find the probability of not selecting a koi fish.

Or

Find the probability of selecting neither angel fish nor flowerhorn fish.

38. Samarth usually go to fruit seller shop with his mother. He observe the following two situations.
- On 1st day : The cost of 2 kg of apples and 1 kg of grapes was found to be ₹160.
- On 2nd day : The cost of 5 kg of apples and 2 kg of grapes was found to be ₹380.
- Denoting the cost of 1 kg apples by ₹x and cost of 1 kg grapes by ₹y, answer the following questions.



Use the above information to answer the questions that follow:

- (a) Represent algebraically the situation of 1st and 2nd day.
- (b) Find the cost of 1 kg apples and 1 kg grapes.

Or

- At what point the linear equation represented on day 1 intersect x-axis and y-axis.
- (c) Find the total cost of 3 kg apples and 2 kg grapes.
