DOON GLOBAL SCHOOL

HALF YEARLY EXAMINATIONS (2024-25)

CLASS - X

SUBJECT- MATHEMATICS

TIME – 3Hrs **M. MARKS- 80**

INSTRUCTIONS:

1. **This question paper contains- five sections A, B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.**
2. **Section A has 20 MCQs carrying 1 mark each.**
3. **Section B has 5 questions of 2 marks each.**
4. **Section C has 6 questions of 3 marks each.**
5. **Section D has 4 questions of 5 marks each.**

Section E has 3 case based integrated units of assessment (4 marks each) with sub parts of the values of 1,1 and 2 marks each respectively.

SECTION-A

(Section A consists of 20 questions of 1 mark each)

Q1. If two positive integers p and q can be expressed as p = ab^2 and q = a^3b; where a, b being prime numbers ,then LCM(p,q) is equal to

(a) ab (b) a^2b^2 (c) a^3b^2 (d) a^2b^3

Q2. If two numbers do not have common factor (other than 1), then they are called

a) prime numbers b) co -prime numbers c) composite numbers d) twin primes

Q3. If one root of the polynomial f(x) = 3x^2 + 11x + p is reciprocal of the other, then the value of p is

a) 0 b) 3 c) - 3 d) 1/3

Q4. If x $\tan 45^0 \sin 30^0 = \cos 30^0 \tan 30^0$,then x is equal to

a) -1/2 b) 1/2 c) -2 d) 2

Q5. $\frac{1-\cos A}{\sin A}$ is equal to

$(a)\frac{\sin A}{1-\cos A}$ $(b)\frac{\sin A}{1+\cos A}$ $(c)\frac{\cos A}{1-\cos A}$ $(d)\frac{\cos A}{1+\cos A}$

Q6. The ratio of HCF to LCM of the least composite number and the least prime number is :

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

Q7. The pair of equations x = a and y = b graphically represent lines which are

(a) Parallel (b) intersecting at (b, a) (c) coincident (d) intersecting at (a, b)

Q8. The value of k for which the system of equations x + y – 4 = 0 and 2x +ky =3, has no solution, is

(a) -2 (b) k ≠ 2 (c) 3 (d) 2

Q9. $(x^2+1)^2 - x^2$ =0 has

(a) Four real roots (b) two real roots (c) no real roots (d) one real roots

Q10. Which of the following equations has two distinct real roots?

(a) $2x^2 - 3\sqrt{2}\,x + \frac{9}{4} = 0$ (b) $x^2 + x - 5 = 0$ (c) $x^2 + 3x + 2\sqrt{2} = 0$ (d) $5x^2 - 3x + 1 = 0$

Q11. If α, β are the zeroes of the polynomial p(x) = $4x^2$ – 3x – 7, then
(a) 7/3 (b) 7/3 (c) 3/7 (d) 3/7

Q12. In an A.P, if d= -2, n= 5 and a_n= 0, the value of a is
(a) 10 (b) 5 (c) -8 (d) 8

Q13. If the common difference of an AP is 3, then $a_{20} - a_{15}$ is
(a) 5 (b) 3 (c) 15 (d) 20

Q14. Two APs have the same common difference. The first term of one of these is -1 and that of the other is -8. Then the difference between their 4th terms is
(a) -1 (b) -8 (c) 7 (d) -9

Q15. If the nth term of an AP is (2n +1), then the sum of its first three terms is
(a) 6n + 3 (b) 15 (c) 12 (d) 21

Q16. If cosec A - cot A = $\frac{4}{5}$, then cosec A =
(a) $\frac{47}{40}$ (b) $\frac{59}{40}$ (c) $\frac{51}{40}$ (d) $\frac{41}{40}$

Q17.If sin A + cos A = 0, then $sin^4A + cos^4A =$
(a) 2 (b)1 (c) 3/4 (d) 1/2

Q18. A card is drawn at random from a well-shuffled pack of 52 cards. The probability that the card drawn is not an ace is:
(a) 1/3 (b) 9/13 (c) 4/13 (d) 1/2

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

Choose the correct option

Q19. Assertion (A): 2 is a rational number.

Reason (R): The square roots of all positive integers are irrationals.

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

Q20. **Assertion x + y – 4=0 and 2x +ky - 3 =0 has no solution if k = 2.**

Reason: $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ are consistent if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$.

(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 consist of 5 questions of 2 marks each)

Q21. If 8th term of an A.P. is half of its second term and 11th term exceeds one third of its fourth term by 1. Find the 15th term.

Q22. Given the linear equation 2x+ 3y – 8 = 0. Write another linear equation in two variables such that the geometrical representation of the pair so formed is

Q23. Find the value of k for which the equation $x^2 + k(2x + k - 1) = 0$ has real and equal roots.

OR

If the product of zeros of the polynomial $ax^2 - 6x - 6$ is 4, find the value of a.

Q24. Find the zeroes of a quadratic polynomial 2 x^2 + 3x - 14 and verify the relationship between the zeroes and its coefficients**.**

Q25. If sin A = 3/4, calculate cos A and tan A.

SECTION-C

(Section C consists of 6 questions of 3 marks each)

Q26. Solve the following quadratic equation for x, $4x^2$+ 4bx – (a^2- b^2) =0

Q27. A moving boat is observed from the top of 150 m high cliff moving away from the cliff. The angle of depression of the boat changes from 60^0 to 45^0 in 2 minutes. Find the speed of the boat in m/min. [use $\sqrt{3}$= 1.732]

Q28. In triangle PQR, right angled at Q, PR + QR = 25 cm and PQ=5cm.Determine the values of sin P, cos P and tan P.

OR

If tan (A+B) = $\sqrt{3}$ and tan (A - B) = 1, $0^0 < A + B < 90^0$,A> B,then find A and B.

Q29. Given that $\sqrt{2}$ is irrational number, then prove that 7 - 4$\sqrt{2}$ is also irrational number.

Q30. If $\frac{x}{a}cos\theta + \frac{y}{b}sin\theta = 1$ and $\frac{x}{a}sin\theta - \frac{y}{b}cos\theta = 1$, prove that $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 2$.

Q31. In a single of throw of two dice, find the probability of (i) getting a total of 10 (ii) a getting a total of 9 or 11 (iii) getting a sum greater than 9.

SECTION- D

(Section D consist of 4 questions of 5 marks each)

Q32. One fourth of a herd of camels was seen in a forest. Twice the square root of the herd had gone to mountains and the remaining 15 camels were seen on the bank of a river. Find the total number of camels.

OR

Speed of a boat in still water is 15km/h. It goes 30km upstream and returns back at the same point in 4 hours 30 minutes. Find the speed of the stream.

Q33. Solve the pair of linear equation in two variables s – t = 3 and $\frac{s}{3} + \frac{t}{2}$ = 6.

Q34. If the sum of first 7 terms of an A.P is 49 and that of first 17 term is 289, find the sum of its first n terms.

Q35. Prove that $\frac{tan\theta}{1-cot\theta} + \frac{cot\theta}{1-tan\theta} = 1 + sec\theta\ cosec\theta$.

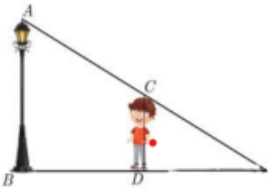
SECTION-E

(Case study-based questions are compulsory).

Q36. India is competitive manufacturing location due to the low cost of manpower and strong technical and engineering capabilities contributing to higher quality production runs. The production of TV sets in a factory increases uniformly by a fixed number every year. It produced 16000 sets in 6th year and 22600 in 9th year. Based on the above information, answer the following questions:

(i) Find the production during first year.
(ii) Find the production during first 3 year.
(iii) In which year, the production is Rs. 29,200.

Q37. Priyanshu is very intelligent in math. He always try to relate the concept of math in daily life. One day he is walking away from the base of a lamp post at a speed of 1 m/s. Lamp is 4.5 m above the ground.



1. If after 2 second, length of shadow is 1 meter, what is the height of Priyanshu?
2. What is the minimum time after which his shadow will become larger than his original height?
3. What is the distance of Priyanshu from pole at this point?

OR

What will be the length of his shadow after 4 seconds?

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Q38. The tradition of pottery making in India is very old. In fact, it is older than Indus Valley Civilization. The shaping and baking of clay articles has continued through the ages. The picture of a potter is shown below: A potter makes a certain number of pottery articles in a day. It was observed on a particular day the cost of production of each article (in ₹) was one more than twice the number of articles produced on that day. The total cost of production on that day was ₹ 210.

1. Taking number of articles produced on that day as x, form a quadratic equation in x.

2. Find the number of articles produced and the cost of each article.

3. Find the cost of production of 15 articles.

OR

Find the number of articles made by Potter in a day if the total cost of production is₹ 1575