AGA KHAN UNIVERSITY EXAMINATION BOARD

HIGHER SECONDARY SCHOOL CERTIFICATE

CLASS XI

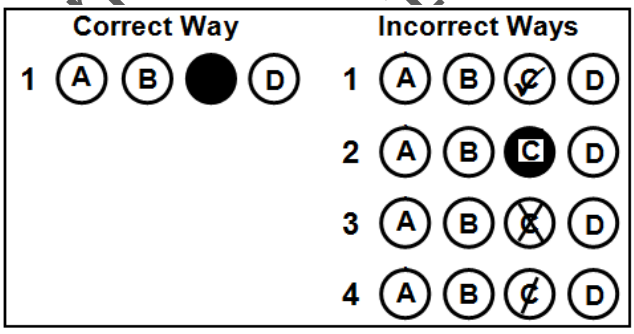
ANNUAL EXAMINATIONS 2022

Business Mathematics

Time: 1 hour 20 minutes Marks: 40

INSTRUCTIONS

1. Read each question carefully.
2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.
3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 40 only.
4. In each question, there are four choices A, B, C, D. Choose ONE. On the answer grid, black out the circle for your choice with a pencil as shown below.



Candidate's Signature

5. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.
6. The marks obtained on the 40 MCQs will be equated to the total marks of 50 for the theory examination results.
7. DO NOT write anything in the answer grid. The computer only records what is in the circles.
8. You may use a scientific calculator if you wish.

1. Increasing Rs 60 in the ratio of $3:2$ gives

   A. Rs 30
   B. Rs 90
   C. Rs 120
   D. Rs 180

2. In a school, the number of students in a class was reduced by 2:5. If 20 students are now allowed to sit in the class, then the actual number of students in the class was

   A. 8
   B. 28
   C. 50
   D. 60

3. The given table shows the relation between the values of x and y.

x	2	3	6
y	21	14	7

   From the table, the value of proportionality constant k is

   A. $\frac{2}{21}$
   B. $\frac{21}{2}$
   C. 23
   D. 42

4. A quantity y varies directly with x and inversely with t. If the constant of proportionality is 4, then the value of p is

x	6	p
y	12	3
t	2	20

   A. 0.67
   B. 15
   C. 24
   D. 26.7

5. The size of a paper is 24 cm by 30 cm. If the length and width are decreased in the ratio of 2:3, then the resulting size of the paper will be

   A. 8 cm by 10 cm.
   B. 24 cm by 20 cm.
   C. 16 cm by 30 cm.
   D. 16 cm by 20 cm.

6. After a discount of 8%, a fan costs Rs 3,500. The marked price of the fan was

   A. Rs 3301.9
   B. Rs 3290.0
   C. Rs 3780.0
   D. Rs 3804.3

7. Atifa buys a particular brand of shoes for Rs 5,000 from a factory outlet and sells it at a profit of 10%. The sale price of the shoes will be

   A. Rs 500
   B. Rs 4,500
   C. Rs 5,500
   D. Rs 5,750

8. Aarian took a loan at an interest rate of 5% per annum for a period of 5 years. If the interest on the loan is Rs 15,000, then the principal amount that he borrowed was

   A. Rs 60,000
   B. Rs 75,000
   C. Rs 375,000
   D. Rs 600,000

9. Karim is planning to borrow loan from a bank. If the nominal interest rate of the bank is 10% per annum for 5 years, then the effective annual rate would be

   A. 0.59
   B. 0.61
   C. 1.59
   D. 1.61

10. Which of the following statements is INCORRECT for ordinary annuity?

   A. Payments are made annually only.
   B. Payments are made at the end of the period.
   C. Housing loan is an example of ordinary annuity.
   D. The value of an ordinary annuity goes up when the interest rate falls.

Use the given information to answer Q.11 and Q.12.

Zara deposited Rs 5,000 at the end of each period of three months for 6 years at 3% interest compounded quarterly.

11. The number of compounding periods are

A. 12
B. 18
C. 20
D. 24

12. The rate of interest per period is

A. 0.12
B. 0.005
C. 0.0075
D. 0.00125

13. Mr Jamal took a loan of Rs 200,000 from a bank at the interest rate of 9% per annum compounded annually. After three years, the amount payable to the bank will be

A. Rs 254,000.0
B. Rs 259,005.8
C. Rs 272,000.0
D. Rs 282,316.3

14. The slope of the line passing through the points $\left(\frac{a}{b}, \frac{b}{a}\right)$ and $\left(\frac{a}{b}, -\frac{b}{a}\right)$ is

A. $-\frac{2b}{a}$
B. $\frac{2b}{a}$
C. 0
D. ∞

15. The slope of the line $2x + 3y = 0$ is

A. $-\frac{3}{2}$.
B. $-\frac{2}{3}$.
C. $\frac{2}{3}$.
D. $\frac{3}{2}$.

16. If x-intercept and y-intercept of a straight line are $\frac{1}{2}$ and 3 respectively, then equation of the line would be

A. $6x + y = 3$
B. $x + 6y = 3$
C. $3x + 2y = 6$
D. $2x + 3y = 6$

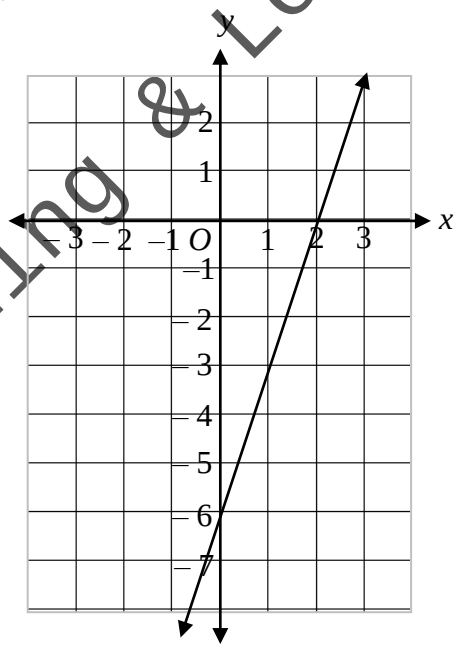
17. The equation of the line parallel to the x-axis and passing through the point $(2, -3)$ is

A. $x + 2 = 0$
B. $x - 2 = 0$
C. $y - 3 = 0$
D. $y + 3 = 0$

18. The equation of the line perpendicular to the line $x + 2y = 0$ and passing through $(0, -1)$ is

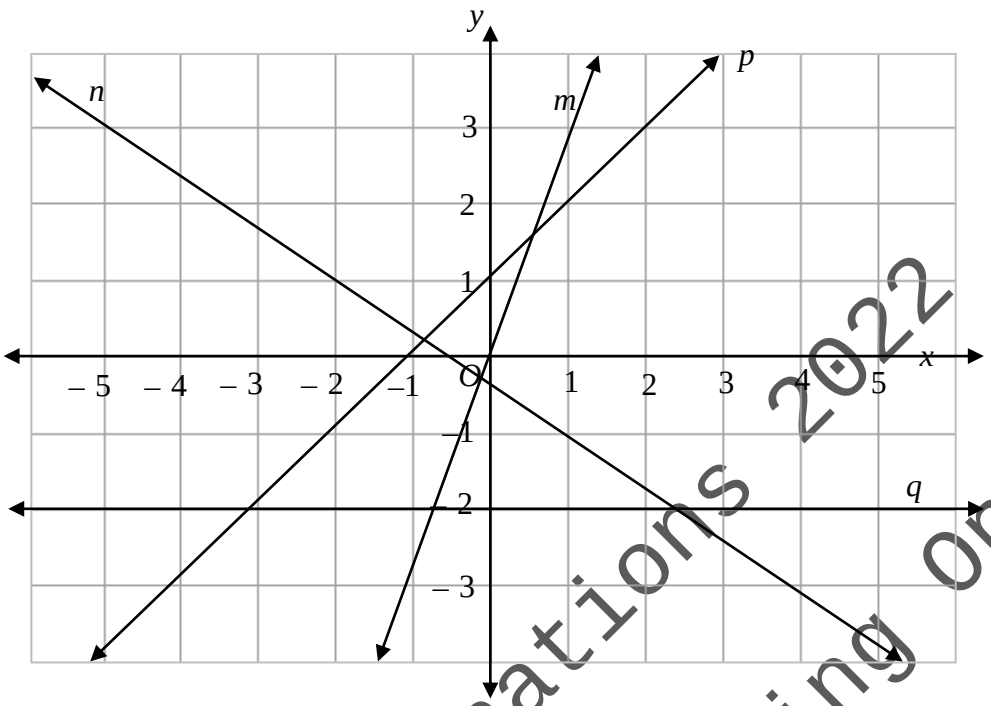
A. $2x - y - 1 = 0$
B. $2x + y + 1 = 0$
C. $x + 2y + 2 = 0$
D. $x - 2y - 2 = 0$

19. In the given graph, the x-intercept of the linear function is



A. -6
B. -2
C. 2
D. 6

20. The given graph shows four linear functions *m*, *n*, *p* and *q*.



Which of the following pair of lines have positive slopes?

A. *m* and *n*.
B. *n* and *p*.
C. *m* and *p*.
D. *p* and *q*.

21. The solutions of the quadratic equation $(x+2)(x-3)=6$ are

A. -2 and 3
B. -3 and 2
C. -3 and 4
D. 4 and 9

22. The minimum value of the function $y=x^2-6x+5$ is

A. -4
B. -3
C. 4
D. 5

23. What should be added to the expression $5x^2 - 3x$ to make it a complete square?

A. $\frac{9}{4}$

B. $\frac{3}{10}$

C. $\frac{9}{25}$

D. $\frac{9}{100}$

24. The vertex of the function $y = x^2 - 6x + 10$ lies at the point

A. $(3, 4)$.

B. $(3, -4)$.

C. $(1, 3)$.

D. $(3, 1)$.

25. The range of the function $y = (x-1)^2 - 1$ is

A. $0 \le y < \infty$.

B. $-1 \le y < \infty$.

C. $1 \le y < \infty$.

D. $-\infty < y < \infty$.

26. Atif and Alam working together can complete a certain task is 5 days. While working alone, Atif would take 5 days lesser than Alam to complete the task. If x represents the number of days taken by Alam, then the equation representing this situation is

A. $\frac{1}{x} - \frac{1}{5} = \frac{1}{x-5}$.

B. $\frac{1}{x} + \frac{1}{5} = \frac{1}{x-5}$.

C. $\frac{1}{x} + \frac{1}{x-5} = \frac{1}{5}$.

D. $\frac{1}{x} - \frac{1}{5} = \frac{1}{x+5}$.

27. If $y = (x-1)^2 + 5$ represents the cost function of an enterprise, then the minimum cost of the enterprise is

(**Note**: The values of the constants and variables are in thousands rupees.)

A. -7
B. 5
C. 6
D. 9

28. The value of x satisfying the simultaneous linear equations $x - 2y = 10$ and $y - x = 2$ is

A. -14
B. -6
C. 14
D. 34

29. The solution set of the simultaneous equations $x^2 + 3y^2 = 4$ and $x^2 - 1 = 0$ is

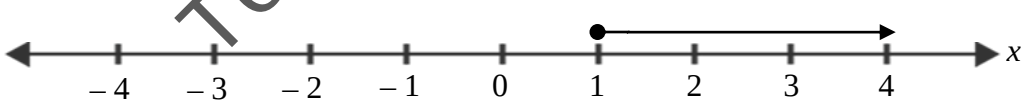
A. $\{\pm 1\}$.
B. $\{\pm 1, 0\}$.
C. $\{(\pm 1, \pm 1)\}$.
D. $\{(\pm 1, \pm \sqrt{5})\}$.

30. Which of the following point(s) lie(s) in the solution region of $x + y < 3$ and $x < 2$?

I. $(1,1)$
II. $(2,1)$
III. $(1,2)$

A. I only.
B. II only.
C. I and II.
D. II and III.

31. The inequality whose solution is represented by the given number line is

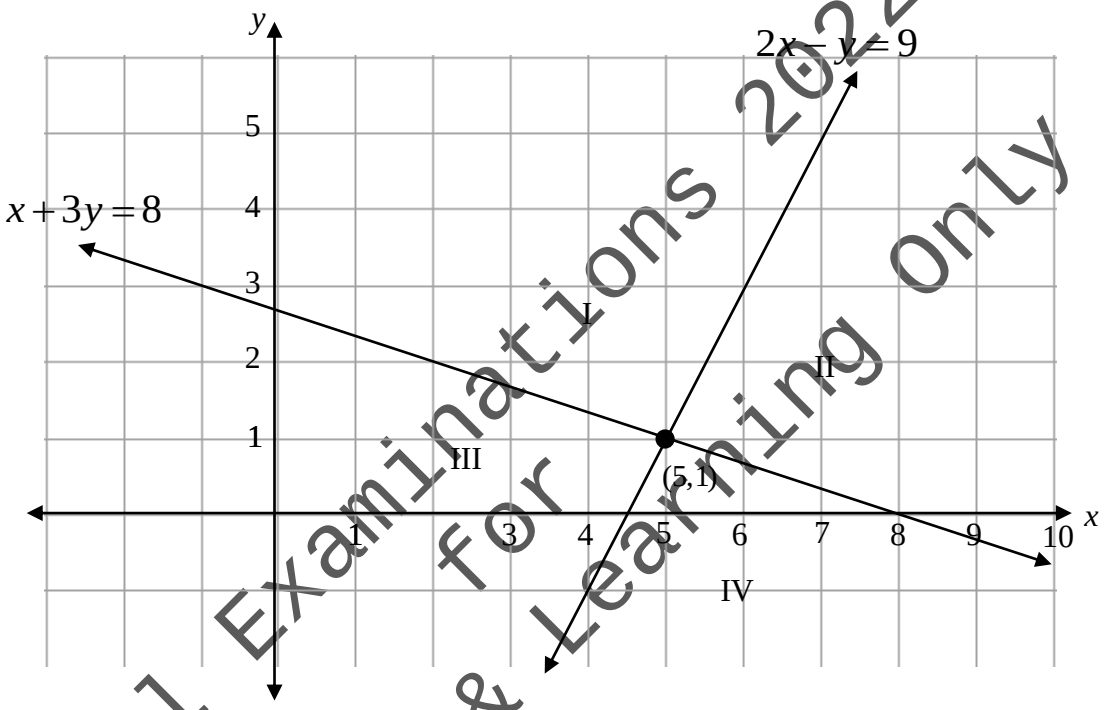


A. $x < 1$
B. $x > 1$
C. $x \leq 1$
D. $x \geq 1$

32. Which of the following points lies in the solution region of $x+2y<3$ and $3x-y>1$?

A. $(0,0)$
B. $(2,0)$
C. $(0,1)$
D. $(1,1)$

33. The given graph shows four different regions labelled as I, II, III and IV. Which region represents the solution of the inequalities $x+3y<8$ and $2x-9<y$?



A. I
B. II
C. III
D. IV

34. The additive identity of the matrix $\begin{bmatrix} -2 & 1 \\ 1 & -1 \end{bmatrix}$ is

A. $\begin{bmatrix} 2 & -1 \\ -1 & 1 \end{bmatrix}$.

B. $\begin{bmatrix} -2 & -1 \\ -1 & -1 \end{bmatrix}$.

C. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$.

D. $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$.

35. If c is a non-zero real number, then $c\begin{bmatrix} a & 1 \\ 1 & b \end{bmatrix}$ is equal to

A. $\begin{bmatrix} ac & c \\ 1 & b \end{bmatrix}$.

B. $\begin{bmatrix} ac & 1 \\ c & b \end{bmatrix}$.

C. $\begin{bmatrix} ac & 1 \\ 1 & bc \end{bmatrix}$.

D. $\begin{bmatrix} ac & c \\ c & bc \end{bmatrix}$.

36. For matrices $E = \begin{bmatrix} 2 \\ -3 \end{bmatrix}$ and $F = \begin{bmatrix} -3 & 2 \end{bmatrix}$, the product $E \times F$ is

A. $\begin{bmatrix} -6 & 4 \\ 9 & -6 \end{bmatrix}$.

B. $\begin{bmatrix} -6 & -6 \end{bmatrix}$.

C. $\begin{bmatrix} -6 \\ -6 \end{bmatrix}$.

D. $\begin{bmatrix} -12 \end{bmatrix}$.

37. For the matrix equation $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}\begin{bmatrix} 2 \\ 3 \end{bmatrix} = \begin{bmatrix} a \\ b \end{bmatrix}$, the values of a and b, respectively, are

A. 2 and 3
B. 3 and 2
C. 2 and -3
D. -3 and 2

38. If $\begin{bmatrix} 6 & 3 \\ 4 & a \end{bmatrix}$ is a singular matrix, then the value of a is

A. -2
B. 0
C. 2
D. 6

39. If $P = \begin{bmatrix} 1 & -3 \\ 2 & -5 \end{bmatrix}$, then the multiplicative inverse of P is

A. $\begin{bmatrix} -1 & 3 \\ -2 & 5 \end{bmatrix}$.

B. $\begin{bmatrix} -1 & 2 \\ -3 & 5 \end{bmatrix}$.

C. $\begin{bmatrix} -5 & -3 \\ 2 & 1 \end{bmatrix}$.

D. $\begin{bmatrix} -5 & 3 \\ -2 & 1 \end{bmatrix}$.

40. On solving the simultaneous equations $-2x + 5y = 11$ and $x - 3y = 5$ by Crammer's rule, x will be equal to

A. $\begin{vmatrix} 5 & -2 \\ 1 & -3 \end{vmatrix}$.

B. $\begin{vmatrix} -2 & 11 \\ 1 & 5 \end{vmatrix}$.

C. $\begin{vmatrix} 11 & 5 \\ 5 & -3 \end{vmatrix}$.

D. $\begin{vmatrix} -2 & 5 \\ 1 & -3 \end{vmatrix}$.

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