

INDIAN SCHOOL AL WADI AL KABIR

Department: APPLIED Mathematics

Class XII

Sample Question Paper

29-08-2021

General Instructions:

1. This question paper contains two parts A and B. Each part is compulsory.
2. Part A carries 32 marks and Part B carries 10 marks.
3. Part-A has Objective Type Questions and Part -B case study-based questions.
4. You may answer any 32 questions from section A and any four sub questions from each question in section B

Part – A:

1. It consists of 39 questions
2. You may answer any 32 questions.

Part – B:

It contains 2 case studies. Each case study comprises of 5 case-based MCQs. An examinee is to attempt any four sub questions from each case study question.

Section A

Q1.	A man rows 15 km upstream and 25 km downstream in 5 hours each time. What is the speed of the current?							
	A	1km/h	B	3km/h	C	5km/h	D	2 km/h
Q2.	A pipe can fill a cistern in 6 hours. Due to a leakage in the tank the cistern is just full in 9 hours. How much time the leakage will take to empty the tank?							
	A	3 hrs	B	6 hrs	C	9 hrs	D	18hrs
Q3.	If $A = \begin{bmatrix} 1 \\ 2 \\ 0 \end{bmatrix}$ and $B = [1 \ 0 \ 2]$ then AB							
	A	is not defined	B	$[1 \ 0 \ 0]$	C	$\begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$	D	$\begin{bmatrix} 1 & 0 & 2 \\ 2 & 0 & 4 \\ 0 & 0 & 0 \end{bmatrix}$
Q4.	If A is a square matrix such that $A^2 = I$, then $(A - I)^3 + (A + I)^3 - 7A$ is equal to							
	A	A	B	$I - A$	C	$I + A$	D	3A

Q5.	If the matrix $\begin{pmatrix} 0 & x & 3 \\ 2 & y & -1 \\ z & 1 & 0 \end{pmatrix}$ is a skew symmetric matrix, then values of x, y and z :			
	A $x=0, y=1, z=0$	B $x=2, y=0, z=3$	C $x=-2, y=1, z=-3$	D $x=-2, y=0, z=-3$
Q6.	If $A = \begin{pmatrix} 5 & 0 & 5 \\ 0 & 5 & 0 \\ 0 & 0 & 0 \end{pmatrix}$, then A is			
	A an identity matrix	B a null matrix	C A square matrix	D a scalar matrix
Q7.	If $\begin{pmatrix} 2x-y & 2x-1 \\ 5x-7 & 3x-4 \end{pmatrix} = \begin{pmatrix} 7 & 7y \\ 3x+y & x+4 \end{pmatrix}$, then value of x and y			
	A $x=4, y=-1$	B $x=4, y=1$		
	C $x=1, y=4$	D $x=-4, y=1$		
Q8.	If the demand function $p(x) = 20 - \frac{x}{2}$ then the marginal revenue when $x = 10$			
	A ₹ 10	B ₹ 15	C ₹ 20	D ₹ 25
Q9.	The value of $\begin{vmatrix} 3 & 10 & 103 \\ 5 & 9 & 95 \\ 7 & 5 & 57 \end{vmatrix}$			
	A 1	B 0	C 255	D none of these
Q10.	Which of the following statement is/are correct? a) Matrix multiplication is not commutative b) Determinant is a number associated to a square matrix c) All square matrices are symmetric matrices d) If any two rows of a determinant are interchanged, then the value remains unchanged.			
	A a) and b)	B a) and d)	C Only c)	D None of the statements

Q11.	If $\begin{vmatrix} 3-x & 3+x & 3+x \\ 3+x & 3-x & 3+x \\ 3+x & 3+x & 3-x \end{vmatrix} = 0$, then the values of x							
	A	0 or 3	B	0 or 9	C	0 or -9	D	3 or 9
Q12.	For the two-sector economy input- output table is given below. Find the technology matrix.							
	<i>Output</i> →		Industry 1	Industry 2	Final Demand	Total output		
	<i>Input</i> ↓							
	Industry 1		14	6	8	28		
	Industry 2		7	18	11	36		
	A	$\begin{pmatrix} 14 & 6 \\ 7 & 18 \end{pmatrix}$			B	$\begin{pmatrix} \frac{1}{2} & \frac{3}{14} \\ \frac{7}{11} & \frac{1}{2} \end{pmatrix}$		
	C	$\begin{pmatrix} \frac{1}{6} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{4} \end{pmatrix}$			D	$\begin{pmatrix} \frac{1}{2} & \frac{1}{6} \\ \frac{1}{4} & \frac{1}{2} \end{pmatrix}$		
Q13	If $\begin{bmatrix} x+y+z \\ x+y \\ y+z \end{bmatrix} = \begin{bmatrix} 9 \\ 5 \\ 7 \end{bmatrix}$ then $x - y + z =$							
	A	0	B	1	C	2	D	3
Q14	If $y = (x + \sqrt{x^2 + a^2})^n$, prove that $\frac{dy}{dx}$							
	A	$\frac{ny}{\sqrt{x^2 + a^2}}$	B	ny	C	$\frac{ny}{x + \sqrt{x^2 + a^2}}$	D	$\frac{n}{y\sqrt{x^2 + a^2}}$
Q15	If $x = at^2, y = 4at$, then $\frac{dy}{dx}$ at $t = 2$							
	A	0	B	1		2	D	$\frac{1}{2}$
Q16	A, B and C enter into a partnership. B contributes one third of the capital while A contributes as much as B and C together contribute. The ratio of their capital is							
	A	1:2:3	B	2:3:1	C	3:2:1	D	3:1:2

Q17	Akshay started a business by investing ₹ 40000 After 4 months Ashwin joined his business and invested ₹ 50000 The share of Ashwin in the profit if they earn ₹ 220000 as profit in the entire year							
	A	₹ 120000	B	₹ 110000	C	₹ 100000	D	₹ 90000
Q18	The total revenue in ₹ received from the sale of x units of a product is given by $R(x) = 3x^2 + 36x + 5$. The marginal revenue, when $x = 15$							
	A	₹ 116	B	₹ 96	C	₹ 90	D	₹ 126
Q19	In a 1000 metres race. A, B, and C get the gold, silver, and bronze medals, respectively. If A beats B by 100 metres and B beats C by 100 metres, then by how many metres does A beat C?							
	A	190m	B	200m	C	300m	D	100m
Q20	If $a > b$ and $c < 0$ the which of the following are true? (i) $ac > bc$ (ii) $a + c < b + c$ (iii) $a - c > b - c$							
	A	(i)	B	(i)and (ii)	C	(iii)only	D	None of these
Q21	What time will it be after 200 hours, if the present time is 5:00 am?							
	A	5:00 am	B	5:00 pm	C	1:00pm	D	1:00am
Q22	Two pipes A and B can fill a tank in 24 minutes and 32 minutes respectively. If both the pipes are opened simultaneously, after how much time B should be closed so that the tank is full in 18 minutes?							
	A	10 minutes	B	8 minutes	C	6 minutes	D	4 minutes
Q23	The probability of an event A occurring is 0.4 and of B is 0.5. If A and B are mutually exclusive events, then find the probability of neither A nor B.							
	A	0.4	B	0.1	C	0.3	D	0.2

Q24	The mean of the numbers obtained on throwing a die having written 1 on three faces, 2 on two faces and 5 on one face is							
A	1	B	2	C	5	D	$\frac{8}{3}$	
Q25	Suppose that two cards are drawn at random from a deck of cards. Let X be the number of aces obtained. Then the value of E(X) is							
A	$\frac{37}{221}$	B	$\frac{5}{13}$	C	$\frac{1}{13}$	D	$\frac{2}{13}$	
Q26	A die is thrown 6 times. If 'getting an odd number' is a success, what is the probability of 5 successes?							
A	$\frac{1}{64}$	B	$\frac{3}{32}$	C	$\frac{63}{64}$	D	$\frac{21}{64}$	
Q27	In a box containing 100 bulbs, 10 are defective. The probability that out of a sample of 5 bulbs, none is defective is							
A	10^{-1}	B	$\left(\frac{1}{2}\right)^5$	C	$\left(\frac{9}{10}\right)^5$	D	$\frac{9}{10}$	
Q28	Suppose X has a binomial distribution B(6, $\frac{1}{2}$), then the most likely outcome is							
A	X=2	B	X=3	C	X=4	D	X=5	
Q29	A and B throw a die alternatively till one of them gets a '6' and wins the game. Find the probability of A wins, if A starts first							
A	$\frac{6}{11}$	B	$\frac{5}{11}$	C	$\frac{2}{5}$	D	$\frac{2}{25}$	

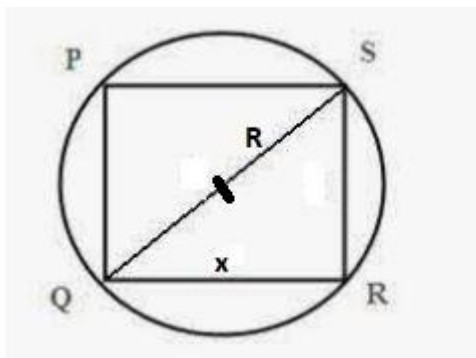
Q30	<p>The random variable X has a probability distribution P(X) of the following form, where k is some number:</p> $P(x) = \begin{cases} k, & \text{if } x = 0 \\ 2k, & \text{if } x = 1 \\ 3k, & \text{if } x = 2 \end{cases}$ <p>and P(x)=0 otherwise</p> <p>Determine the value of k</p>							
A	$\frac{1}{6}$	B	$\frac{5}{11}$	C	$\frac{2}{5}$	D	$\frac{1}{5}$	
Q31	<p>What is the remainder when $783 \times 657 \times 594 \times 432 \times 346 \times 251$ is divided by 5</p>							
A	0	B	1	C	2	D	3	
Q32	<p>If $A = \begin{pmatrix} 1 & 2 \\ 3 & 5 \end{pmatrix}$ then A^{-1}</p>							
A	$\begin{pmatrix} -5 & 2 \\ 3 & -1 \end{pmatrix}$	B	$\begin{pmatrix} 1 & 3 \\ 2 & 5 \end{pmatrix}$	C	$\begin{pmatrix} -1 & 2 \\ 3 & -5 \end{pmatrix}$	D	$\begin{pmatrix} -1 & -2 \\ 3 & 5 \end{pmatrix}$	
Q33	<p>If A (3, 5), B (4, 7) and C (0, k) are collinear, then k=</p>							
A	0	B	1	C	-1	D	2	
Q34	<p>The CP of type 1 rice is ₹ 60 per Kg and that of type2 is ₹ 80 per Kg If both are mixed in the ratio 2:3 then the price per Kg of the mixed rice is ₹-----</p>							
A	70	B	75	C	65	D	72	
Q35	<p>How many times a fair coin to be tossed so that the probability of getting at least one head is more than 90%</p>							

	A	1	B	2	C	3	D	4
Q36	If the mean and variance of a binomial distribution is $\frac{3}{2}$ and $\frac{3}{4}$ then $P(x=1)$							
	A	$\frac{3}{8}$	B	$\frac{3}{4}$	C	$\frac{1}{8}$	D	$\frac{1}{2}$
Q37	<p>The statement given below has been followed by two conclusions.</p> <p>Statement: $b \leq d > e \leq a = f > c$</p> <p>Conclusion I: $e < f$. Conclusion II: $e = f$</p> <p>Then which of the following is true?</p>							
	A	I is true II is false	B	Either I or II is true	C	I is false and II is true	D	Both I and II are false
Q38	<p>(i) Statement: The local minimum value of $f(x) = x^3 - 3x$ is at $x = 1$ and local minimum value = -2.</p> <p>(ii) Reason: The point 'c' is a point of local minimum if $f'(c) = 0$ and $f''(c) > 0$ and we say f(c) is a local minimum value of f(x)</p>							
	A	Both (i) and (ii) are correct	B	Only (i) is correct	C	Only(ii) is correct	D	Both (i) and (ii) are false
Q39	<p>Which of the following statements are correct?</p> <p>(i) If A and B are independent events $P(A \cap B) = 0$</p> <p>(ii) If A and B are independent events $P(A \cap B) = P(A)P(B)$</p> <p>(iii) If A and B are mutually exclusive events $P(A \cap B) = 0$</p> <p>(iv) If A and B are mutually exhaustive events $P(A \cup B) = 1$</p>							
	A	(i)only	B	(i)(ii) (iii) and (iv)	C	(ii), (iii) and (iv)	D	None of these

Section- II

Case study-based questions are compulsory. Attempt any four from each question (39 to 40)

- Q40.** A gardener wants to construct a rectangular garden in a circular path of land. He takes the maximum perimeter of the rectangular region as possible.



Based on the above information answer the following:

- (i) If $QR = x$ and R be the radius of the land, then the perimeter of rectangle PQRS
- A $2x + 2\sqrt{R^2 - x^2}$ B $2(x + R)$ C $x\sqrt{R^2 - x^2}$ D $2x + 2\sqrt{4R^2 - x^2}$
- (ii) If A represents the area of rectangle then to find maximum area of rectangle
- A $\frac{dA}{dx} = 0$ B $\frac{dA}{dR} = 0$ C $\frac{dA}{dx} \leq 0$ D $\frac{dR}{dx} \geq 0$
- (iii) Area of the rectangle is maximum when
- A $x = R$ B $x = \sqrt{2}R$ C $x = \frac{R}{\sqrt{2}}$ D $x = \sqrt{3}R$
- (iv) Area is maximum when the quadrilateral is
- A a square B a parallelogram C a trapezium D a rectangle
- (v) What is the maximum area of PQRS when radius is 10m?
- A 100 sq. m. B 200 sq. m C 50sq.m D 400 sq. m

Q41. On his birthday Hari decided to donate some money to children of an orphanage home. If there were 10 children less, everyone would have got ₹ 30 more. However, if there were 10 children more, everyone would have got ₹ 20 less.

Based on the above information answer the following:

(i) The algebraic equations in terms of x and y are

- A** $x + y = 30; x - y = 20$ **B** $3x - y = 30; 2x - y = -20$ **C** $x - 3y = 30; x - 2y = -20$ **D** $x + 3y = 300; 2x + y = 20$

(ii) Which of the following represents the matrix form of the algebraic equations?

- A** $\begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 30 \\ -20 \end{pmatrix}$ **B** $\begin{pmatrix} 3 & -1 \\ 2 & -1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 30 \\ -20 \end{pmatrix}$ **C** $\begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 30 \\ -20 \end{pmatrix}$ **D** $\begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 30 \\ -20 \end{pmatrix}$

iii) The number of students in the orphanage is

- A** 20 **B** 30 **C** 40 **D** 50

iv) Amount received by each child is ₹ _____

- A** 90 **B** 100 **C** 120 **D** 150

v) Total amount donated ₹ _____

- A** 6000 **B** 5000 **C** 7500 **D** 10000

1.	A	11.	C	21.	C	31.	D	40.(i)	D
2.	D	12.	D	22.	B	32.	A	40(ii)	A
3.	D	13.	D	23.	B	33.	C	40(iii)	B
4.	A	14.	A	24.	B	34.	D	40(iv)	A
5.	D	15.	B	25.	D	35.	D	40(v)	B
6.	C	16.	C	26.	B	36.	A	41(i)	B
7.	B	17.	A	27.	C	37.	B	41(ii)	B
8.	A	18.	D	28.	B	38.	A	41(iii)	D
9.	B	19.	A	29.	A	39.	C	41(iv)	C
10.	A	20.	C	30.	A			41(v)	A