

I-ARCH Nata Coaching Centre

JEE-2024

Total Marks:

Student name:

Time:

- Let $A = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \\ 9 & 9 & 9 & 9 \\ 8 & 8 & 8 & 8 \end{bmatrix}$, then determinant of $A =$
 A. -1 B.72 C.0 D.1
- Let x_1, x_2, x_3, x_4, x_5 be observations with mean m and standard deviation s . Then, which of the following statements are correct:
 A. Mean of the observations $x_1 + k, x_2 + k, x_3 + k, x_4 + k, x_5 + k$ is $m + 5k$.
 B. Mean of the observations $kx_1, kx_2, kx_3, kx_4, kx_5$ is km .
 C. The standard deviation of the observations $x_1 + k, x_2 + k, x_3 + k, x_4 + k, x_5 + k$ is s .
 D. The standard deviation of the observations $kx_1, kx_2, kx_3, kx_4, kx_5$ is k^5s .
 Choose the correct answer from the options given below:
 A. A, B, C, D B. A, C only C. B, C only D. B, D only
- If α and β are the roots of $ax^2 + bx + c = 0$, then the value of $\frac{1}{(a\alpha+b)^2} + \frac{1}{(a\beta+b)^2}$ is
 A. $\frac{b^2-2ac}{ac}$ B. $\frac{b^2-2c}{c^2}$ C. $\frac{b^2-2ac}{(ac)^2}$ D. $\frac{b^2-2c}{c}$
- If $(1 + \cos x) \frac{dy}{dx} - (y - 3) \sin x = 0$ and $y(0) = 0$, then the value of $y\left(\frac{\pi}{2}\right)$ is
 A. -3 B. 9 C. 6 D. 3
- If a straight line passing through point $P(3,-5)$ is such that its intercepted portion between the co-ordinate axes is bisected at P , then the equation of the line is
 A. $5x + 3y + 30 = 0$ B. $-5x - 3y + 30 = 0$
 C. $5x - 3y + 30 = 0$ D. $5x - 3y - 30 = 0$
- Suppose L is the line joining the points $(0, 0)$ and $(1, 2)$. If a line parallel to L meets the curve $y = 2x^2 + 3x + 1$ only at a single point P is
 A. $\left(\frac{-3}{4}, \frac{5}{16}\right)$ B. $\left(\frac{-1}{4}, \frac{3}{8}\right)$ C. $(2,15)$ D. $\left(\frac{1}{4}, \frac{3}{8}\right)$
- Let the area of the region enclosed between the two circles $x^2 + y^2 = a^2$ and $(x - a)^2 + y^2 = a^2$ be $\frac{m}{3}(4\pi - 3\sqrt{3})$ sq. units for some $a \geq 2$. If a is a root of $x^3 - 3x^2 - 6x + 8 = 0$, then
 A. $m^4 = a^2$ B. $m^2 = a^3$ C. $m^3 = a^2$ D. $m^2 = a^4$
- The first two terms of G.P are x^{-3} and x^n , respectively. If x^{42} is the sixth term of the same progression, then n^2 is equal to
 A. 36 B. 25 C. 16 D. 9
- The intercept on the line $x = y$ by the circle $x^2 + y^2 - 2y = 0$ is AB . The equation of the circle with AB as a diameter is
 A. $x^2 + y^2 - x - y = 0$ B. $x^2 + y^2 + x + y = 0$
 C. $x^2 + y^2 - x + y = 0$ D. $x^2 + y^2 + x - y = 0$
- If the vectors $\overrightarrow{AB} = 3\hat{i} + 8\hat{k}$ and $\overrightarrow{AC} = 5\hat{i} - 2\hat{j} + 6\hat{k}$ are the sides of a triangle ABC , then the length of the median through A is
 A. $\sqrt{56}$ B. $\sqrt{66}$ C. $\sqrt{33}$ D. $\sqrt{72}$
- The sum of all those terms of the arithmetic progression $2, 6, 10, 14, \dots$, 598

Which are not divisible by 3, is equal to

- A. 30600 B. 30000 C. 29400 D. 30300

12. A college awarded 38 medals for cricket, 15 for tennis and 20 for football. If these medals were bagged by a total of 58 students and only 3 students got medals for all the three games, then how many students received medals for exactly two of the three games?

- A. 18 B. 6 C. 9 D. 12

13. The value of $\int_0^1 \log_e \left(\frac{1}{x} - 1\right) dx$ is

- A. 1 B. $\frac{1}{2}$ C. 0 D. 2

14. Suppose $\begin{vmatrix} f'(x) & f(x) \\ f''(x) & f'(x) \end{vmatrix} = 0$, where $f(x)$ is continuously differentiable function with $f(x) \neq 0 \forall x \in \mathbb{R}$ and

satisfies $f(0) = 1$ and $f'(0) = 4$. If $f(x) = e^{\lambda x} + \mu$, where $\lambda, \mu \in \mathbb{R}$ then the value of $\lambda^2 + \mu^2$ is

- A. 8 B. 16 C. 2 D. 4

15. In how many ways can we select four cards from an ordinary pack of playing cards so that two of them are of the same denomination and the remaining two are of some other same denomination?

- A. 150 B. 715 C. 78 D. 5616

16. A manufacturer can sell x items at a price of ₹ $\left(5 - \frac{x}{100}\right)$ each. The cost price of x items is ₹ $\left(\frac{x}{5} + 500\right)$. The number of items he should sell to reach maximum profit is

- A. 100 B. 480 C. 500 D. 240

17. If the coefficient of x^7 and x^8 in the expansion of $\left(2 + \frac{x}{3}\right)^n$ are equal, then n is

- A. 56 B. 55 C. 45 D. 15

18. If the foot of the perpendicular from the point $(0,0,0)$ on the line $\frac{x+2}{5} = \frac{y+2}{2} = \frac{z+8}{3}$ is (a, b, c) , then

$a^2 + b^2 + c^2$ is

- A. 24 B. 44 C. 34 D. 14

19. If $\vec{a} = 6\hat{i} + 2\hat{j} - \lambda_1\hat{k}$, $\vec{b} = 3\hat{i} + (3 - \lambda_2)\hat{j} + 2\hat{k}$ and $\vec{c} = 2\hat{i} + (1 + \lambda_3)\hat{j} - 3\hat{k}$ are three vectors such that $\vec{a} = 3\vec{c}$ and \vec{b} is perpendicular to \vec{c} then $(\lambda_1, \lambda_2, \lambda_3)$ is

- A. $\left(9, 21, -\frac{1}{3}\right)$ B. $\left(\frac{1}{3}, -\frac{1}{3}, \frac{1}{3}\right)$
 C. $(3, 3, 1)$ D. $\left(9, 3, -\frac{1}{3}\right)$

20. Match List I with List II

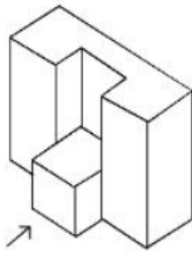
LIST I		LIST II	
A.		I.	Neither surjective nor injective
B.		II.	Surjective but not injective
C.		III.	Injective but not surjective
D.		IV.	Injective and surjective

Choose the correct answer from the options given below

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

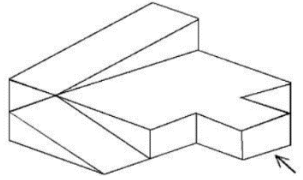
21. A line touches the curve $y = y(x)$ at a point (x, y) having slope $\frac{1+y^2}{1+x^2}$, where $x > 0$. If $y(2) = 1, y(3) = \frac{\alpha}{\beta}$ and $\gcd\{\alpha, \beta\} = 1$, then the value of $\alpha + \beta$ is _____.

22. Let R be the point $(13, -8, 10)$ and $P(\alpha, \beta, \lambda)$ be the image of the point $Q(5, 2, 1)$ in the line $x - 2 = 3 - y = z + 1$. Then the square of the area of the triangle PQR is _____.
23. Let A be a matrix satisfying $A^3 = 3A + 2I$ where $A \neq nI, n \in \mathbb{Z}$. If $A^2 + \alpha A + \beta I = O$, then the maximum value of $|\alpha + \beta|$ is _____.
24. An equilateral triangle is inscribed in the ellipse $\frac{x^2}{3} + y^2 = 1$ such that one of the vertex of the triangle is $(0, 1)$ and one of the altitude of the triangle is along the y -axis. If A is the area of the equilateral triangle. Then $625A^2$ is equal to _____.
25. The number of pairs (x, y) satisfying the equations $\sin x + \sin y = \sin(x - y)$ and $|x| + |y| = 1$ is _____.
26. A hospital conducts a free eye check-up drive at 3 different locations A, B and C of a city. The number of people that came at B is same as that at C. The results show that 4% population at A, 2% at B and 3% at C have poor eye-sight. If a person from the city goes for an army job and is found to have poor eye-sight, and the probability that he is not from location C is $\frac{p}{q}$, where $\frac{p}{q}$ is in simplest form, then value of $(p + q)$ is _____.
27. The equations $ax^2 + bx + a = 0$ ($a, b \in \mathbb{R}$) and $x^3 - 2x^2 + 2x - 1 = 0$ have two common roots. Then the value of $a + b$ is _____.
28. The equation of the base of an equilateral triangle is $x + y = 1$ and the opposite vertex has co-ordinates $(-3, 2)$. The area of the triangle (in square units) is represents by A , then the value of $\sqrt{3}A$ is _____.
29. If the function $f(x)$ is defined as $f(x) = \begin{cases} \frac{1}{1+e^{\sin x}} & \sin x \\ \sqrt{1-x^2} & 2 \end{cases}$. Then the value of $\frac{1}{\pi} \int_{-\pi/2}^{\pi/2} f(x) dx$ is equal to _____.
30. The volume of the greatest cylinder that can be inscribed in a cone of height $\frac{3}{\sqrt{\pi}}$ and semi-vertical angle 45° is _____.
31. The question figure shows the 3D view of an object. Identify the correct view of the object looking in the direction of arrow.

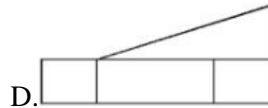
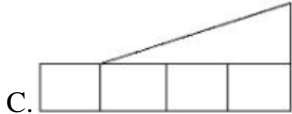


- A. B. C. D.

32. In question figure – 3D object is given, identify the correct view of the object looking in the direction of the arrow, amongst the answer figures.



- A. B.



33. The botanical name of “MANGO” tree is
 A. Azadirachita Indica B. Delonux Indica
 C. Delonux Regia D. Mangifera Indica
34. Who is known as “Father of contemporary architecture”?
 A. Louis Sullivan B. Norman Foster
 C. Frank Gehry D. Le Corbusier
35. Lines those branch off of a central point are referred to as:
 A. Radiation B. Rhythm C. Proportion D. Repetition
36. ‘Kuchipudi’ is a unique dance from which state?
 A. Madhya Pradesh B. Kerala C. Andhra Pradesh D. Tamil Nadu
37. Match List I and List II

LIST I (Components/ Materials)		LIST II (Functions)	
A.	Cement	I.	Load Bearing
B.	Window	II.	Tensile strength
C.	Foundation	III.	Setting time
D.	Steel	IV.	Glazing

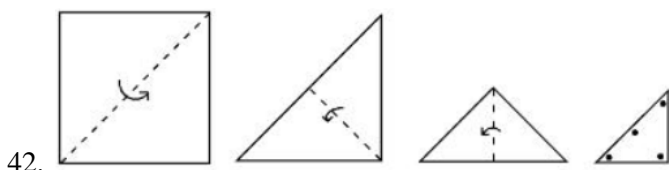
Choose the correct answer from the options given below:

- A. A-IV, B-III, C-II, D-I
 B. A-I, B-II, C-III, D-IV
 C. A-I, B-IV, C-III, D-II
 D. A-III, B-IV, C-I, D-II
38. Who initiated the construction of Qutub-Minar, Delhi?
 A. Muhammed Azam Shah B. Qutub-Ud-din-Aibak
 C. Iltutmish D. Muhammed Quli Qutub Shah
39. Sill level is associated with
 A. Roof B. Column C. Window D. Staircase
40. Match List I with List II

LIST I		LIST II	
A.	Stairs	I.	Key stone
B.	Door	II.	Toothing
C.	Arch	III.	Jamb
D.	Brick work	IV.	Tread

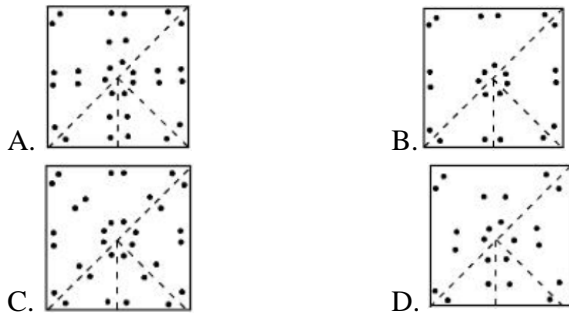
Choose the correct answer from the options given below:

- A. A-I, B-III, C-IV, D-II
 B. A-III, B-IV, C-II, D-I
 C. A-II, B-I, C-III, D-IV
 D. A-IV, B-III, C-I, D-II
41. Who among the following architects has not won the Pritzker prize till 2019?
 A. Arata Isozki B. B.V.Doshi C.I.M. Pie D. Moshe Safdie

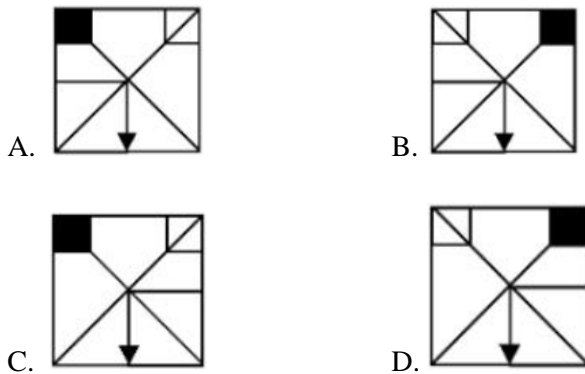
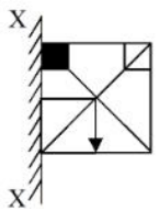


42.

When the paper is folded in a given pattern and is cut at the end. Identify which pattern is formed when the paper is unfold?



43. Identify the true mirror image of the figure amongst the answer figures with respect to X-X



44. A man is facing towards East and turns through 45° anti-clockwise, again 180° anticlockwise and then turns through 270° clockwise. In which direction is he facing now?

- A. North-East B. South C. South-West D. South-East

45. Who designed 'India Gate'?

- A. Raj-Rewal B. George Ritter C. Norman Foster D. Edwin Luytens

46. Identify the name of the Landmark:



- A. The Louvre, Paris B. Crystal Palace, London
C. German Pavilion for World exhibition, Barcelona D. Vitra Design Museum, Basel

47. Which of the following structure does not have a dome?

- A. Gol Gumbaz B. Avicii Arena C. St. Paul's Cathedral D. The Shard

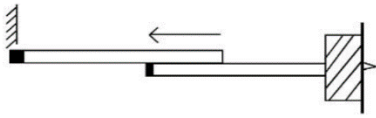
48. Primary colours are _____.

- A. Red, Green, Blue B. Red, Green, Yellow C. Red, Blue, Yellow D. Red, Violet, Yellow

49. What is the terminology for the vertical portion between each tread of the stairs?

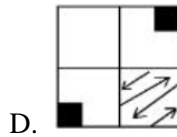
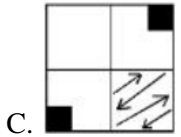
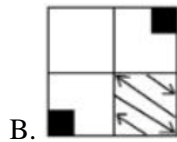
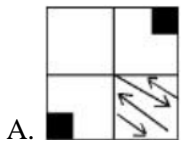
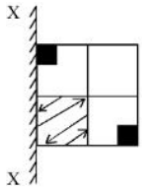
- A. Winter B. Riser C. Nosing D. Going

50. Identify the architectural symbol represented in the given figure.

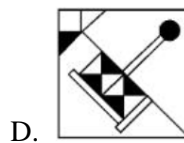
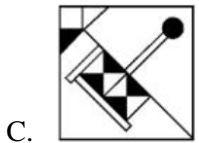
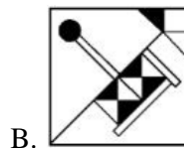
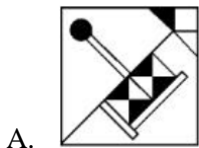
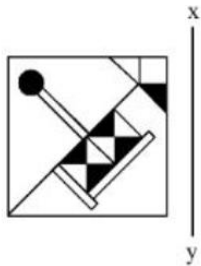


- A. Rolling shutter B. Sliding door C. Revolving door D. Window

51. Identify the true mirror image of the figure amongst the answer figures with respect to X-X:



52. Identify the correct mirror image of the given figure along x-y axis :



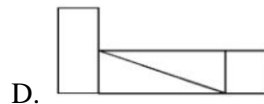
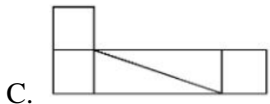
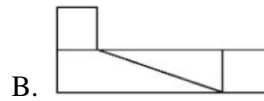
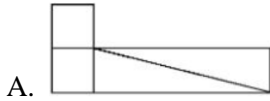
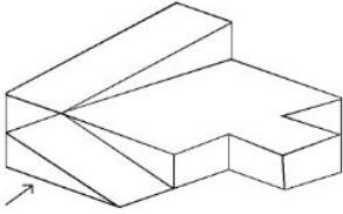
53. On an engineer scale, 1 cm=10 m. Identify the representative fraction (R.F)

- A. 1/10000 B. 1/1000 C. 1/10 D. 1/100

54. V7 concept of Chandigarh city is associated with which architect?

- A. Le Corbusier B. Zaha Hadid C. Patric Geddes D. Frank O Gehri

55. The question figure shows the 3D view of an object. Identify the correct view of the object looking in the direction of arrow :



56. Given below are two statements; one is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A: Social integration at work place is necessary.

Reason R: There are many backward classes in society.

In the light of the above statements, choose the correct answer from the options given below:

- A. **A** is true but **R** is false.
- B. **A** is false but **R** is true.
- C. Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.
- D. Both **A** and **R** are true and **R** is the correct explanation of **A**.

57. Given below is the famous temple in India. Identify the style of temple architecture adopted in the temple.

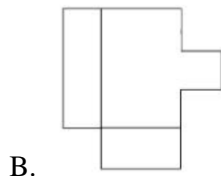
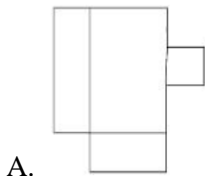
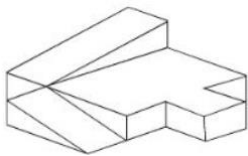


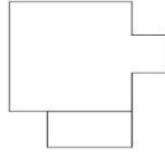
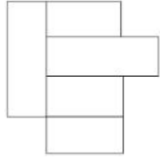
- A. Orissan
- B. Vesara
- C. Nagara
- D. Dravidian

58. In a code language, if “BRICK” is written as “CQJBL”, then “CEMENT” is _____.

- A. DDNFOS
- B. DDNDOS
- C. DDOFOS
- D. DDODOS

59. In the question figure a 3-D object is given. Identify the correct top view of the object amongst the answer figures.





C.

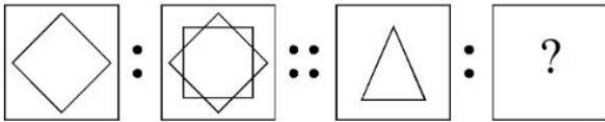
D.



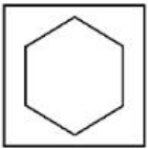

60. The stairs kept in motion by a revolving drum is known as a _____.
 A. Lift B. Revolving stairs C. Escalator D. Elevator
61. Identify the famous Monument in the given picture.



- A. Chand Baoli B. Airavates-vara Temple C. Stepped Pyramid D. Golden Lily Pond

62. When is the world Environment Day celebrated?
 A. 22 March B. 15 August C. 10 July D. 5 June
63. Select a figure amongst the answer figures which will continue the same series or pattern as established by the problem figures.

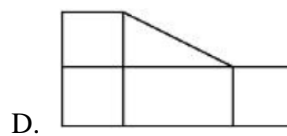
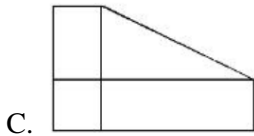
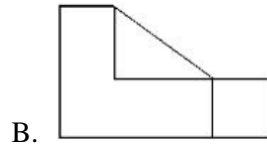
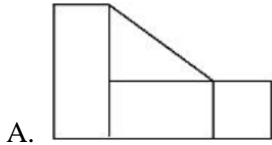
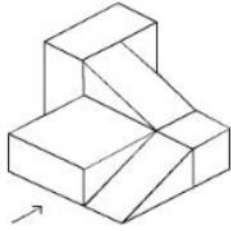


- A. 
- B. 
- C. 
- D. 

64. Give below are two statements:
Statement I: A partition wall is defined as an internal wall whose function is to divide the space within the building.

Statement II: Partition wall could be load bearing or non-load bearing.
 In the light of the above statements, choose the *most appropriate* answer from the options given below.

- A. Both Statement I and Statement II are correct.
 B. Both Statement I and Statement II are incorrect.
 C. Statement I is incorrect but Statement II is correct.
 D. Statement I is correct but Statement II is incorrect.
65. Which building material is primarily used as a building material for the Great Wall of China?
 A. Timber B. Brick C. Steel D. Concrete
66. In a certain word code, EXHAUST is written as CZFCSUR. How is NETWORK
 A. LGVYQTM B. LCRYQTM C. LCVYQTI D. LGRYMTI
67. In question figure a 3-D object is given. Identify the correct view of the object looking in the direction of arrow, amongst the answer figures.



68. Complete the number sequence :

18, 27, 38, 51,....., 83

- A. 64 B. 72 C. 66 D. 62

69. Identify the mirror image of the given word:

PROGRESS

- A. PROGRESS B.
- C. D.

70. Terra cotta is a type of earthen work which is processed by :

- A. Drying in the sun B. Mixing with lime C. Compacting with pressure D. Burning at high temperature

71. Percentage of lime content in ordinary Portland cement is

- A. 70%-80% B. 40%-50% C. 60%-70% D. 30%-40%

72. FAR stands for

- A. Fire Arch Ratio B. Floor Area Ratio C. Fire Accessible Ramp D. Façade Area Ratio

73. The 'lightness or darkness' of a colour is defined as:

- A. Value B. Hue C. Dullness D. Bright less

74. Which of the below given material is not a plaster type?

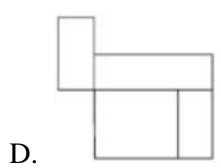
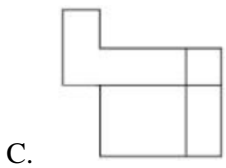
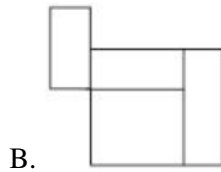
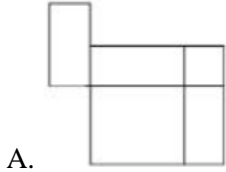
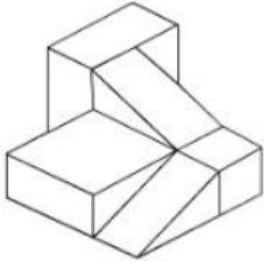
- A. MDF B. Lime C. Cement D. Gypsum

75. Identify the iconic Landmark :



- A. Sydney Opera House B. One World Trade Center
C. Taipei 101 D. Shanghai World Financial Center

76. In the question figure a 3-D object is given. Identify the correct top view of the object amongst the answer figures.



77. Match List I with List II

LIST I (structure)		LIST II (places)	
A.	Humayun's Tomb	I.	Gujarat
B.	Bibi Ka Maqbara	II.	New Delhi
C.	Hussain Doshi Gufa	III.	Maharashtra
D.	Group of monuments, Mahabalipuram	IV.	Tamilnadu

Choose the correct answer from the options given below:

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

78. Visual weight is associated with:

- A. Texture
- B. Pattern
- C. Balance
- D. Emphasis

79. Scientific study of human body measurements :

- A. Anthropometry
- B. Axenometry
- C. Anthrology
- D. Depth Perception

80. Match List I with List II

LIST I (Plan)		LIST II (Building Name)	
A.		I.	Taj Mahal
B.		II.	Qutub Minar, New Delhi
C.		III.	Matri Mandir, Auroville
D.		IV.	Sanchi Stupa

Choose the correct answer from the options given below:

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

81. Draw the sketch of the image given below in detail:

Use monochromatic colour rendering techniques, light and shadow to represent its depth and intensity.



82. Draw G20 Logo with one Alphabet, two numeric, a triangle, a circle, and a rectangle. Use any 3 colours of your choice.

(OR)

Draw sketch of a road in one point perspective. Imagine the road to be a vehicular road with both side footpath having vendors and hawkers around it. Use colours of your choice.