This booklet contains 32+4 printed pages.

PAPER - 2: MATHEMATICS & APTITUDE TEST

Do not open this Test Booklet until you are asked to do so.

Read carefully the Instructions on the Back Cover of this Test Booklet.

Important Instructions:

1. Immediately fill in the particulars on this page of the Test Booklet with Black Ball Point Pen provided in the examination hall.

2. This Test Booklet consists of three parts - Part I, Part II and Part III. Part I has 30 objective type questions of Mathematics consisting of FOUR (4) marks each for correct response. Part II Aptitude Test has 50 objective type questions consisting of FOUR (4) marks each for correct response. Mark your answers for these questions in the appropriate space against the question in the Answer Sheet placed inside this Test Booklet. Use the Black Ball Point Pen provided in the examination hall for writing particulars on Side-1 and Side-2 of the Answer Sheet. Do not use water colours.

3. There is only one correct response for each question in Part I and Part II. Filling up more than one response in each question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instruction 2 above.

4. The test is of 3 hours duration. The maximum marks are 390.

5. On completion of the test, the candidates must hand over the Answer Sheet of Mathematics and Aptitude Test-Part I & II and the Drawing Sheet of Aptitude Test-Part III alongwith Test Booklet for Part III to the Invigilator in the Room/Hall. Candidates are allowed to take away with them the Test Booklet of Mathematics and Aptitude Test-Part I & II.

6. The CODE for this Booklet is W. Make sure that the CODE printed on Side-2 of the Answer Sheet and on the Drawing Sheet (Part III) is the same as that on this booklet. Also tally the Serial Number of the Test Booklet, Answer Sheet and Drawing Sheet and ensure that they are same. In case of discrepancy in Code or Serial Number, the candidate should immediately report the matter to the Invigilator for replacement of the Test Booklet, Answer Sheet and the Drawing Sheet.

7. Do not fold or make any stray mark on the Answer Sheet.

Name of the Candidate (in Capitals):

Role Number: in figures

Anubhavik: in words

Examination Centre Number:

Centre of Examination (in Capitals):

Candidate’s Signature:__________

Invigilator’s Signature (1):__________

Invigilator’s Signature (2):__________
Part I / भाग I
Mathematics / गणित

1. If A and B be two finite sets such that the total number of subsets of A is 960 more than the total number of subsets of B, then $n(A) - n(B)$ (where $n(X)$ denotes the number of elements in set $X$) is equal to:

   (1) 2
   (2) 3
   (3) 4
   (4) 6

2. If $\lambda_1$ and $\lambda_2$ are the two values of $\lambda$ such that the roots $\alpha$ and $\beta$ of the quadratic equation, $\lambda(x^2 - x) + x + 5 = 0$ satisfy $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} + \frac{4}{5} = 0$, then $\frac{\lambda_1}{\lambda_2} + \frac{\lambda_2}{\lambda_1}$ is equal to:

   (1) 536
   (2) 512
   (3) 504
   (4) 488

3. If $(x + iy)^2 = 7 + 24i$, then a value of

   $\left(7 + \sqrt{-576}\right)^{\frac{1}{2}} - \left(7 - \sqrt{-576}\right)^{\frac{1}{2}}$ is:

   (1) $-3i$
   (2) $2i$
   (3) 6
   (4) $-6i$

W/Page 2     SPACE FOR ROUGH WORK / रफ कार्य के लिए जगह
4. Let \( S \) be the set of all real values of ‘\( a \)’ for which the following system of linear equations
\[
\begin{align*}
ax + 2y + 5z &= 1 \\
2x + y + 3z &= 1 \\
3y + 7z &= 1
\end{align*}
\]
is consistent. Then the set \( S \) is:
(1) equal to \( \mathbb{R} \)
(2) equal to \( \mathbb{R} - \{1\} \)
(3) equal to \( \{1\} \)
(4) an empty set

5. For all real numbers \( x, y \) and \( z \), the determinant
\[
\begin{vmatrix}
2x & xy-xz & y \\
2x+z+1 & xy-xz+yz-z^2 & 1+y \\
3x+1 & 2xy-2xz & 1+y
\end{vmatrix}
\]
is equal to:
(1) zero
(2) \((x-y) (y-z) (z-x)\)
(3) \((x-yz) (y-z)\)
(4) \((y-xz) (z-x)\)

6. An urn contains 5 red, 4 black and 3 white marbles. Then the number of ways in which 4 marbles can be drawn from it so that at most 3 of them are red, is:
(1) 455
(2) 460
(3) 490
(4) 495
7. If the digits at ten’s and hundred’s places in \(11^{2016}\) are \(x\) and \(y\) respectively, then the ordered pair \((x, y)\) is equal to:

(1) (1, 6)
(2) (6, 1)
(3) (8, 1)
(4) (1, 8)

8. Let \(a_1, a_2, a_3, a_4, a_5\) be a G.P. of positive real numbers such that the A.M. of \(a_2\) and \(a_4\) is 117 and the G.M. of \(a_2\) and \(a_4\) is 108. Then the A.M. of \(a_1\) and \(a_5\) is:

(1) 108
(2) 117
(3) 144.5
(4) 145.5

9. If the sum of the first 15 terms of the series \(3 + 7 + 14 + 24 + 37 + \ldots\) is 15 \(k\), then \(k\) is equal to:

(1) 122
(2) 81
(3) 119
(4) 126
10. \[ \lim_{{x \to 0}} \frac{\log (\sin 7x + \cos 7x)}{\sin 3x} \] equals:

(1) \( \frac{7}{3} \)
(2) \( \frac{14}{3} \)
(3) \( \frac{1}{3} \)
(4) \( \frac{1}{3} \log 7 \)

11. If the function \( f: \mathbb{R} \to \mathbb{R} \), defined by

\[
f(x) = \begin{cases} 
ex, & x < 2 
ax^2 - bx + 3, & x \geq 2
\end{cases}
\]

is differentiable, then the value of \( f'(-3) + f'(3) \) is equal to:

(1) 3
(2) 4
(3) \( \frac{15}{2} \)
(4) 0

12. The sum of the abscissae of the points where the curves,

\[ y = kx^2 + (5k + 3)x + 6k + 5, \ (k \in \mathbb{R}) \]

touch the \( x \)-axis, is equal to:

(1) \( -\frac{19}{3} \)
(2) \( -\frac{10}{3} \)
(3) \( \frac{5}{3} \)
(4) \( -\frac{4}{3} \)
13. Water is running into an underground right circular conical reservoir, which is 10 m deep and radius of its base is 5 m. If the rate of change in the volume of water in the reservoir is \( \frac{3}{2} \pi \text{ m}^3/\text{min.} \), then the rate (in m/min) at which water rises in it, when the water level is 4 m, is:

   (1) \( \frac{3}{8} \)

   (2) \( \frac{1}{8} \)

   (3) \( \frac{1}{4} \)

   (4) \( \frac{3}{2} \)

14. The integral \( \int \frac{x + 2}{(x^2 + 3x + 3) \sqrt{x + 1}} \, dx \) is equal to:

   (1) \( \frac{1}{\sqrt{3}} \tan^{-1} \left[ \frac{x}{\sqrt{3} (x+1)} \right] + C \)

   (2) \( \frac{2}{\sqrt{3}} \tan^{-1} \left[ \frac{x}{\sqrt{3} (x+1)} \right] + C \)

   (3) \( \frac{2}{\sqrt{3}} \cot^{-1} \left[ \frac{x}{\sqrt{x+1}} \right] + C \)

   (4) \( \frac{1}{\sqrt{3}} \cot^{-1} \left[ \frac{x \sqrt{3}}{\sqrt{x+1}} \right] + C \)

   (where \( C \) is a constant of integration)
15. The integral \( \int_{\frac{\pi}{24}}^{\frac{5\pi}{24}} \frac{dx}{1 + \frac{3}{2}\tan 2x} \) is equal to:

(1) \( \frac{\pi}{3} \)

(2) \( \frac{\pi}{12} \)

(3) \( \frac{\pi}{6} \)

(4) \( \frac{\pi}{18} \)

16. If the line, \( y = mx \), bisects the area of the region

\( \{(x, y) : 0 \leq x \leq \frac{3}{2}, 0 \leq y \leq 1+4x-x^2 \} \), then \( m \) equals:

(1) \( \frac{9}{8} \)

(2) \( \frac{13}{3} \)

(3) \( \frac{13}{6} \)

(4) \( \frac{39}{16} \)
17. The order and the degree of the differential equation of all ellipses with centre at the origin, major axis along \( x \)-axis and eccentricity \( \frac{\sqrt{3}}{2} \) are, respectively:

(1) 1, 1  
(2) 2, 1  
(3) 1, 2  
(4) 2, 2

18. If an equilateral triangle, having centroid at the origin, has a side along the line, \( x + y = 2 \), then the area (in sq. units) of this triangle is:

(1) 6  
(2) \( 6\sqrt{3} \)  
(3) \( \frac{9}{2}\sqrt{3} \)  
(4) \( 3\sqrt{6} \)

19. The equation of the circle, which is the mirror image of the circle, \( x^2 + y^2 - 2x = 0 \), in the line, \( y = 3 - x \) is:

(1) \( x^2 + y^2 - 6x - 8y + 24 = 0 \)  
(2) \( x^2 + y^2 - 8x - 6y + 24 = 0 \)  
(3) \( x^2 + y^2 - 4x - 6y + 12 = 0 \)  
(4) \( x^2 + y^2 - 6x - 4y + 12 = 0 \)

---

17. उन सभी दीर्घचक्रों, जिनका केन्द्र मूल बिंदु है, दीर्घ अक्ष, \( x \)-अक्ष की दिशा में है तथा उक्तकुँड़ा \( \frac{\sqrt{3}}{2} \) है, के अवकल समीकरण की कोटि तथा घात क्रमशः हैं:

(1) 1, 1  
(2) 2, 1  
(3) 1, 2  
(4) 2, 2

18. एक समबाहु त्रिभुज, जिसका केन्द्र मूल बिंदु है, की एक भूजा रेखा \( x + y = 2 \) की दिशा में है, तो त्रिभुज का क्षेत्रफल (वर्ग इकाइयों में) हैं:

(1) 6  
(2) \( 6\sqrt{3} \)  
(3) \( \frac{9}{2}\sqrt{3} \)  
(4) \( 3\sqrt{6} \)

19. उस वृत्त का समीकरण, जो वृत्त \( x^2 + y^2 - 2x = 0 \) की रेखा \( y = 3 - x \) में दर्पण प्रतिबिंब है, है:

(1) \( x^2 + y^2 - 6x - 8y + 24 = 0 \)  
(2) \( x^2 + y^2 - 8x - 6y + 24 = 0 \)  
(3) \( x^2 + y^2 - 4x - 6y + 12 = 0 \)  
(4) \( x^2 + y^2 - 6x - 4y + 12 = 0 \)
20. The product of the perpendiculars drawn from the foci of the ellipse, \( \frac{x^2}{9} + \frac{y^2}{25} = 1 \) upon the tangent to it at the point \( \left( \frac{3}{2}, \frac{5\sqrt{3}}{2} \right) \), is:

(1) 9  
(2) \( \frac{189}{13} \)  
(3) 18  
(4) \( 3\sqrt{13} \)

21. Which one of the following points does not lie on the normal to the hyperbola, \( \frac{x^2}{16} - \frac{y^2}{9} = 1 \), drawn at the point \( (8, 3\sqrt{3}) \)?

(1) \( (13, -\frac{1}{\sqrt{3}}) \)  
(2) \( (12, \frac{1}{\sqrt{3}}) \)  
(3) \( (11, \sqrt{3}) \)  
(4) \( (10, \sqrt{3}) \)
22. If the shortest distance between the lines $x + 2\lambda = 2y = -12z$, $x = y + 4\lambda = 6z - 12\lambda$ is $4\sqrt{2}$ units, then a value of $\lambda$ is:

1. $2$
2. $\sqrt{2}$
3. $2\sqrt{2}$
4. $\frac{\sqrt{2}}{2}$

23. The perpendicular distance from the point $(3, 1, 1)$ on the plane passing through the point $(1, 2, 3)$ and containing the line, $\vec{r} = \hat{i} + \hat{j} + \lambda (2\hat{i} + \hat{j} + 4\hat{k})$, is:

1. $\frac{1}{\sqrt{11}}$
2. $\frac{4}{\sqrt{11}}$
3. $0$
4. $\frac{3}{\sqrt{11}}$

24. Three vectors $\vec{a}$, $\vec{b}$, and $\vec{c}$ are such that $|\vec{a}| = 1$, $|\vec{b}| = 2$, $|\vec{c}| = 4$ and $\vec{a} + \vec{b} + \vec{c} = \vec{0}$. Then the value of $4\vec{a} \cdot \vec{b} + 3\vec{b} \cdot \vec{c} + 3\vec{c} \cdot \vec{a}$ is equal to:

1. $-68$
2. $-26$
3. $-34$
4. $27$

22. यदि रेखाओं $x + 2\lambda = 2y = -12z$, $x = y + 4\lambda = 6z - 12\lambda$ के बीच न्यूनतम दूरी $4\sqrt{2}$ इकाई है, तो $\lambda$ का एक मान है:

1. $2$
2. $\sqrt{2}$
3. $2\sqrt{2}$
4. $\frac{\sqrt{2}}{2}$

23. बिंदु $(3, 1, 1)$ से एक समतल, जो बिंदु $(1, 2, 3)$ से होकर जाता है तथा जिस पर रेखा $\vec{r} = \hat{i} + \hat{j} + \lambda (2\hat{i} + \hat{j} + 4\hat{k})$ रहता है, पर डाले गए लम्ब की लंबाई है:

1. $\frac{1}{\sqrt{11}}$
2. $\frac{4}{\sqrt{11}}$
3. $0$
4. $\frac{3}{\sqrt{11}}$

24. तीन सदिश $\vec{a}$, $\vec{b}$ तथा $\vec{c}$ ऐसे हैं कि $|\vec{a}| = 1$, $|\vec{b}| = 2$, $|\vec{c}| = 4$ तथा $\vec{a} + \vec{b} + \vec{c} = \vec{0}$ है, तो $4\vec{a} \cdot \vec{b} + 3\vec{b} \cdot \vec{c} + 3\vec{c} \cdot \vec{a}$ का मान है:

1. $-68$
2. $-26$
3. $-34$
4. $27$
25. Two numbers are selected at random (without replacement) from the first six positive integers. If X denotes the smaller of the two numbers, then the expectation of X, is:

(1) \( \frac{14}{3} \)

(2) \( \frac{13}{3} \)

(3) \( \frac{7}{3} \)

(4) \( \frac{5}{3} \)

26. If A and B are two independent events such that \( P(A) = \frac{3}{10} \) and \( P(A \cup B) = \frac{4}{5} \), then \( P(A \cap B) \) is equal to:

(1) \( \frac{1}{5} \)

(2) \( \frac{1}{10} \)

(3) \( \frac{3}{14} \)

(4) \( \frac{3}{35} \)
27. A bag contains three coins, one of which has head on both sides, another is a biased coin that shows up heads 90% of the time and the third one is an unbiased coin. A coin is taken out from the bag at random and tossed. If it shows up a head, then the probability that it is the unbiased coin, is:

(1) \( \frac{5}{12} \)
(2) \( \frac{5}{24} \)
(3) \( \frac{1}{3} \)
(4) \( \frac{3}{8} \)

28. The value of \( \frac{1}{\cos 285^\circ} + \frac{1}{\sqrt{3} \sin 255^\circ} \), is:

(1) \( 2\sqrt{2} \)
(2) \( \frac{4\sqrt{2}}{3} \)
(3) \( \frac{2\sqrt{2}}{3} \)
(4) \( \sqrt{3} - \sqrt{2} \)
29. An observer standing at a point P on the top of a hill near the sea-shore notices that the angle of depression of a ship moving towards the hill in a straight line at a constant speed is 30°. After 45 minutes, this angle becomes 45°. If T (in minutes) is the total time taken by the ship to move to a point in the sea where the angle of depression from P of the ship is 60°, then T is equal to:

(1) \(45(1 + \sqrt{3})\)

(2) \(45\left(1 + \frac{2}{\sqrt{3}}\right)\)

(3) \(45\left(2 + \frac{1}{\sqrt{3}}\right)\)

(4) \(45\left(1 + \frac{1}{\sqrt{3}}\right)\)

30. Which one of the following statements is a tautology?

(1) \((p \lor q) \rightarrow q\)

(2) \(p \lor (p \rightarrow q)\)

(3) \(p \lor (q \rightarrow p)\)

(4) \(p \rightarrow (p \rightarrow q)\)
Part II / भाग II
Aptitude Test / अभिलक्षण

Directions : (For Q. No. 31 to 33). The problem figure shows the top view of an object. Identify the correct elevation from amongst the answer figures looking in the direction of the arrow.

निर्देश : (प्र. 31 से 33 के लिए)। प्रश्न आकृति में किसी वस्तु का ऊपरी दृष्टि दिखाया गया है। तौर की दिशा देखते हुए उत्तर आकृतियों में से इसका सही सम्पूर्ण दृष्टि पहचानिये।

Problem Figure / प्रश्न आकृति Answer Figures / उत्तर आकृतियाँ

31.  

32.  

33.  

W/Page 14 SPACE FOR ROUGH WORK / रफ कार्य के लिए जगह
Directions : (For Q. No. 34 to 36).

Identify the correct 3-D figure from amongst the answer figures, which has the same elevation, as given in the problem figure on the left.

निर्देश : ( प्र. 34 से 36 के लिए )।

3-D उत्तर आकृतियों में से उस आकृति को पहचानिये जिस का, सम्मुख दृष्ट्य प्रश्न आकृति से मिलती हो।

Problem Figure / प्रश्न आकृति Answer Figures / उत्तर आकृतियाँ

34. 

35. 

36. 

Directions : (For Q. No. 37 to 40).

Which one of the answer figures is the correct mirror image of the problem figure with respect to X - X ?

निर्देश : ( प्र. 37 से 40 के लिए )।

उत्तर आकृतियों में से कौन सी आकृति दो गधी प्रश्न आकृति का X - X से सम्बंधित सही दर्शन प्रतिविम्ब है?

Problem Figure / प्रश्न आकृति Answer Figures / उत्तर आकृतियाँ

37. 

W/Page 15  SPACE FOR ROUGH WORK / रफ कार्य के लिए जगह
Directions: (For Q. No. 41 and 42).

Which one of the answer figures will complete the sequence of the three problem figures?

निदेश: (प्र. 41 और 42 के लिए).

उत्तर आकृतियों में से कौन-सी आकृति को तीन प्रश्न आकृतियों में लगाने से अनुक्रम (sequence) पूरा हो जायेगा?

Problem Figures / प्रश्न आकृतियाँ

Answer Figures / उत्तर आकृतियाँ

41. [Problem Figures] [Answer Figures]

42. [Problem Figures] [Answer Figures]
Directions : (For Q. No. 43 to 45).

Which one of the answer figures shows the correct view of the 3-D problem figure after the problem figure is opened up?

निर्देश : ( प्र. 43 से 45 के लिए )।

3-D प्रश्न आकृति को खोलने पर, उत्तर आकृतियों में से सही दृश्य कौन-सा है?

Problem Figure / प्रश्न आकृति         Answer Figures / उत्तर आकृतियाँ

43.

44.

45.
Directions: (For Q. No. 46).
One of the following answer figures is hidden in the problem figure in the same size and direction. Select the correct one.

/problem figure / प्रश्न आकृति
46. [Problem Figure]

/answer figures / उत्तर आकृतियाँ
46. (1) (2) (3) (4)

Directions: (For Q. No. 47 to 50).
The 3-D figure shows the view of an object. Identify the correct top view from amongst the answer figures.

/problem figure / प्रश्न आकृति
47. [Problem Figure]

/answer figures / उत्तर आकृतियाँ
47. (1) (2) (3) (4)

48. [Problem Figure]

49. [Problem Figure]
Problem Figure / प्रश्न आकृति  

Answer Figures / उत्तर आकृतियाँ  

50.  

Directions: (For Q. No. 51 to 53). The 3-D problem figure shows a view of an object. Identify the correct front view, from amongst the answer figures, looking in the direction of arrow.

निर्देश : ( प्र. 51 से 53 के लिए)।  
3-D प्रश्न आकृति में एक बस्तु के एक दृश्य को दिखाया गया है। तीर की दिशा में देखते हुए, इसके सही सम्पूर्ण दृश्य को उत्तर आकृतियों में से पहचानिए।

Problem Figure / प्रश्न आकृति  

Answer Figures / उत्तर आकृतियाँ  

51.  

52.  

53.  

W/Page 19  SPACE FOR ROUGH WORK / रफ कार्य के लिए जगह
Directions: (For Q. No. 54 to 56).
The 3-D problem figure shows a view of an object. Identify the correct front view, from amongst the answer figures, looking in the direction of arrow.

निदेश: (प्र. 54 से 56 के लिए)
3-D प्रश्न आकृति में एक वस्तु के एक दृश्य को दिखाया गया है। तीर की दिशा में देखते हुए, इसके सही सम्मुख दृश्य को उत्तर आकृतियों में से पहचानिए।

Problem Figure / प्रश्न आकृति  Answer Figures / उत्तर आकृतियाँ
54.

55.

56.

Directions: (For Q. No. 57 to 60).
The problem figure shows the top view of objects. Looking in the direction of the arrow, identify the correct elevation, from amongst the answer figures.

निदेश: (प्र. 57 से 60 के लिए)
प्रश्न आकृति में वस्तुओं का ऊपरी दृश्य दिखाया गया है। तीर की दिशा में देखते हुए उत्तर आकृतियों में से सही सम्मुख दृश्य पहचानिए।

Problem Figure / प्रश्न आकृति  Answer Figures / उत्तर आकृतियाँ
57.
Directions: (For Q. No. 61). From the top view given in the problem figure identify the correct 3-D figure from amongst the answer figures.

निर्देश: (प्र. 61 के लिए)। दी गयी प्रश्न आकृति के ऊपरी दृश्य को सही 3-D उत्तर आकृतियों में से पहचानिये।
Directions : (For Q. No. 62 and 63). The problem figure shows the elevation of an object. Identify the correct top view from amongst the answer figures.

निर्देश : ( प्र. 62 और 63 के लिए )। प्रश्न आकृति में किसी वस्तु का समय दृश्य दिखाया गया है। उत्तर आकृतियों में से इसका सही ऊपर दृश्य पहचानिये।

Problem Figure / प्रश्न आकृति Answer Figures / उत्तर आकृतियाँ

62. 

(1) (2) (3) (4)

63. 

(1) (2) (3) (4)

Directions : (For Q. No. 64 and 65). Find the odd figure out of the problem figures given below.

निर्देश : ( प्र. 64 और 65 के लिए )। नीचे दी गयी प्रश्न आकृतियों में से विषम आकृति पहचानिये।

64. 

(1) (2) (3) (4)

65. 

(1) (2) (3) (4)
<table>
<thead>
<tr>
<th>Question</th>
<th>选项</th>
<th>Question</th>
<th>选项</th>
</tr>
</thead>
<tbody>
<tr>
<td>66. Which color is obtained by mixing red and yellow colors?</td>
<td>(1) Purple</td>
<td>66. लाल एवं पीला रंग मिलाने से कौन सा रंग बनता है?</td>
<td>(1) बैंगनी</td>
</tr>
<tr>
<td></td>
<td>(2) Pink</td>
<td></td>
<td>(2) गुलाबी</td>
</tr>
<tr>
<td></td>
<td>(3) Orange</td>
<td></td>
<td>(3) संतरी</td>
</tr>
<tr>
<td></td>
<td>(4) Brown</td>
<td></td>
<td>(4) भूरा</td>
</tr>
<tr>
<td>67. Salim Chisti mosque is located in:</td>
<td>(1) Gwalior</td>
<td>67. सलीम चिस्ती का मकबरा कहाँ पर स्थित है?</td>
<td>(1) ग्वालियर</td>
</tr>
<tr>
<td></td>
<td>(2) Fatehpur Sikri</td>
<td></td>
<td>(2) फतेहपुर सिकरी</td>
</tr>
<tr>
<td></td>
<td>(3) Hyderabad</td>
<td></td>
<td>(3) हैदराबाद</td>
</tr>
<tr>
<td></td>
<td>(4) Delhi</td>
<td></td>
<td>(4) दिल्ली</td>
</tr>
<tr>
<td>68. Temperature of the Earth due to the ‘Greenhouse Effect’:</td>
<td>(1) Increases</td>
<td>68. धरती का तापमान ‘ग्रीन हाउस प्रभाव’ से :</td>
<td>(1) बढ़ता है</td>
</tr>
<tr>
<td></td>
<td>(2) Decreases</td>
<td></td>
<td>(2) घटता है</td>
</tr>
<tr>
<td></td>
<td>(3) Remains constant</td>
<td></td>
<td>(3) एक समान रहता है</td>
</tr>
<tr>
<td></td>
<td>(4) Keeps increasing/decreasing</td>
<td></td>
<td>(4) बढ़ता/घटता रहता है</td>
</tr>
<tr>
<td>69. Vertical sun protectors over wall openings help in cutting off summer sun rays on:</td>
<td>(1) South side</td>
<td>69. छिड़कों के साथ लगे खड़े सूरज संरक्षक सूर्य किरणों को किस दिशा में काटते हैं?</td>
<td>(1) दक्षिण की तरफ</td>
</tr>
<tr>
<td></td>
<td>(2) West side</td>
<td></td>
<td>(2) पश्चिम की तरफ</td>
</tr>
<tr>
<td></td>
<td>(3) North side</td>
<td></td>
<td>(3) उत्तर की तरफ</td>
</tr>
<tr>
<td></td>
<td>(4) On all sides</td>
<td></td>
<td>(4) हर तरफ</td>
</tr>
</tbody>
</table>
70. Which one of the following is not a load bearing component in a building?
(1) Column
(2) Beam
(3) Partition wall
(4) Concrete floor slab

71. Which type of roof will provide maximum protection from heat radiation in a building?
(1) Painted aluminium sheeting
(2) Concrete slab with plaster
(3) Concrete slab with mud and brick tiles
(4) Concrete slab, water proofed and covered with a roof garden

72. Ellora temples are:
(1) Made in marble
(2) Built in sandstone
(3) Cut out of rock
(4) Built in wood

73. Gol Gumbaj of Bijapur is:
(1) A Fort
(2) A Mausoleum
(3) A Palace
(4) A Mosque
### 74. Buland Darwaza is located in:

(1) Fatehpur Sikri  
(2) Red Fort  
(3) Agra Fort  
(4) Golconda

### 75. Big Ben is a:

(1) Clock Tower  
(2) Palace  
(3) Mosque  
(4) Temple

### 76. IGBC stands for:

(1) International Great Beautiful City  
(2) Indian Green Building Council  
(3) Indian Great Building Center  
(4) Indian Government Biological Center

### 77. Solar energy is converted to electrical energy by:

(1) Photovoltaic cells  
(2) Electro magnets  
(3) Bio technology  
(4) Rain water
<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>78. The ruins of Hampi are located in which State?</td>
<td>(1) Karnataka</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2) Andhra Pradesh</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3) Kerala</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(4) Tamil Nadu</td>
<td></td>
</tr>
<tr>
<td>79. What is Venice famous for?</td>
<td>(1) Canals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2) Mountains</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3) Valleys</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(4) Springs</td>
<td></td>
</tr>
<tr>
<td>80. Pyramids are located in:</td>
<td>(1) Rome</td>
<td></td>
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<tr>
<td></td>
<td>(2) Egypt</td>
<td></td>
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<td></td>
<td>(3) Greece</td>
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<tr>
<td></td>
<td>(4) Ethiopia</td>
<td></td>
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</tbody>
</table>

- O O O -
Space For Rough Work / रफ कार्य के लिए जगह
Space For Rough Work / रफ कार्य के लिए जगह
Read the following instructions carefully:

1. Part I has 30 objective type questions of Mathematics consisting of FOUR (4) marks each for each correct response. Part II (Aptitude Test) has 50 objective type questions consisting of FOUR (4) marks each for each correct response. Part III consists of 2 questions carrying 70 marks which are to be attempted on a separate Drawing Sheet which is also placed inside this Test Booklet. Marks allotted to each question are written against each question. For each incorrect response in Part I and Part II, 1/4 (one-fourth) marks of the total marks allotted to the question (i.e. 1 mark) would be deducted from the total score. No deduction from the total score, however, will be made if no response is indicated for an item in the Answer Sheet.

2. Handle the Test Booklet, Answer Sheet and Drawing Sheet with care, as under no circumstances (except for discrepancy in Test Booklet Code and Answer Sheet Code), another set will be provided.

3. The candidates are not allowed to do any rough work or writing work on the Answer Sheet. All calculations/writing work are to be done on the space provided for this purpose in the Test Booklet itself, marked ‘Space for Rough Work’. This space is given at the bottom of each page and in five pages (Page 27-31) at the end of the booklet.

4. Each candidate must show on demand his/her Admit Card to the Invigilator.

5. No candidate, without special permission of the Superintendent or Invigilator, should leave his/her seat.

6. On completion of the test, the candidates should not leave the examination hall without handing over their Answer Sheet of Mathematics and Aptitude Test Part I & II and Drawing Sheet of Aptitude Test Part III to the Invigilator on duty and sign the Attendance Sheet at the time of handing over the same. Cases where a candidate has not signed the Attendance Sheet the second time will be deemed not to have handed over these documents and dealt with as an unfair means case. The candidates are also required to put their left hand THUMB impression in the space provided in the Attendance Sheet. However, the candidates are also allowed to take away with them the Test Booklet of Mathematics and Aptitude Test Part - I & II.

7. Use of Electronic/Manual Calculator or drawing instruments (such as scale, compass etc.) are not allowed.

8. The candidates are governed by all Rules and Regulations of the Examination body with regard to their conduct in the Examination Hall. All cases of unfair means will be dealt with as per the Rules and Regulations of the Examination body.

9. No part of the Test Booklet, Answer Sheet and Drawing Sheet shall be detached/folded or defaced under any circumstances.

10. The candidates will write the Test Booklet Number as given in the Test Booklet, Answer Sheet and Drawing Sheet in the Attendance Sheet also.

11. Candidates are not allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, electronic device or any other material except the Admit Card inside the examination room/hall.