JEE MAIN 2018

PART-I MATHEMATICS (B.Arch.)

1. If $f(x)+2f(1-x)=x^2+1, \forall x \in R$ If then the range of f is :

(1) $\left(-\infty, \frac{1}{3}\right]$

(2) $\left[-\frac{1}{3}, \infty\right)$

(3) $\left[-\frac{1}{3}, \frac{1}{3}\right]$

(4) $\left[\frac{1}{3}, \infty\right)$

2. Let $A\{z \in C : |z| = 25)$ and $B = \{z \in C : |z+5+12i| = 4\}$. Then the minimum value of $|z-\omega|$, for $z \in A$ and $\omega \in B$, is:

(1) 6

(2) 7

(3) 8

(4) 9

3. If the product of the roots of the equation $x^2 - 5kx + 2e^{2\log}e^{|k|} - 1 = 0$ is 49, then the sum of the squares of the roots of the equation is :

(1) 525

(2) 527

(3) 576

(4) 627

4. If $A=\begin{bmatrix}2 & 52 & 152\\ 4 & 106 & 358\\ 6 & 162 & 620\end{bmatrix}$ then the determinant of the matrix adj $(2A)$ is equal to :

(1) 64

(2) 256

(3) 2048

(4) 4096

5. Let S be the set of all real values of λ for which the system of linear equations

$$\lambda x+y+z=5\lambda$$
$$2\lambda x+2y-z=1$$
$$3y+z=9$$

has infinitely many solutions. Then S ;

(1) equals R

(2) is a singleton.

(3) contains exactly two elements

(4) is an empty set

6. In order to get through in an examination of nine papers a candidate has to pass in more papers than the number of papers in which he fails. The number of ways in which he can fail, in this examination is :

(1) 128

(2) 255

(3) 256

(4) $9\times(8)!$

7. Let T_r denote the r^{th} term in the binomial expansion of $(a+1)^{50}$. If $T_{25}+T_{27}=\frac{125}{52}T_{26}$ then the sum of all the values of a is :

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

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

(3) 2

(4) $\frac{5}{2}$

8. In an ordered set of four numbers, the first 3 are in $A.P$ and the last 3 are in $G.P.$ whose common ratio is $7/4$. If the product of the first and fourth of these number is 49, then the product of the second and third of these is :

(1) 60

(2) 112

(3) 128

(4) 144

9. If $e^{\left(\sin^2 x+\sin^4 x+\sin^6 x+\ldots..+ad\ \inf.\right)\log_e 2}\left(0<x<\frac{\pi}{2}\right)$ satisfies the equation $y^2-5y+4=0$, then $\frac{\sin x}{\cos x-\sin x}$ is equal to :

(1) $-\left(2+\sqrt{2}\right)$

(2) $-\left(\sqrt{2}+1\right)$

(3) $\sqrt{2}-1$

(4) $2+\sqrt{2}$

10. Let $f(x)=x\left[\frac{1}{x}\right]$ for all $x(\neq 0)\in R$ where for each $t\in R,[t]$ denotes the greatest integer less than or equal to t. Then:

(1) $\lim\limits_{x\to 0+} f(x)=0$

(2) $\lim\limits_{x\to \frac{1}{3}+} f(x)=1$

(3) $\lim\limits_{x\to \frac{1}{2}-} f(x)=1$

(4) $\lim\limits_{x\to 2-} f(x)=1$

11. If $f(x)=\begin{cases}\dfrac{72^x-9^x-8^x+1}{\sqrt{2}-\sqrt{1+\cos x}} \\ k\sqrt{2}\log_e 2\log_e 3, x=0\end{cases}$ is a continuous function in the interval $[0,2\pi)$, then k is equal to :

(1) 4

(2) 18

(3) 24

(4) 36

12. If $y=y(x)$ is an implicit function of x given by $ycosx+xcosy=\pi$; then $y''(0)$ is equal to

(1) π

(2) $-\pi$

(3) 0

(4) 2π

13. For each $x \in R$, let $f(x) = |x-1|$, $|x-1|$, $g(x) = \cos x$ and $\phi(x) = f\left(g(2\sin x) - g\left(f(x)\right)\right)$. Then ϕ is :

(1) differentiable at each point of R

(2) not differentiable at 0

(3) not differentiable at 1

(4) differentiable only in $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

14. If $f(x) = |x^2 - 16|$ for all $x \in R$, then the total number of points of R at which $f : R \to R$ attains local extreme values is :

(1) 1

(2) 2

(3) 3

(4) 4

15. Let $I = \int \frac{e^x}{e^{4x} + e^{2x} + 1} dx, \int \frac{e^{-x}}{e^{-4x} + e^{-2x} + 1} dx$, then $J - i$ equals :

(1) $\frac{1}{2}\log_e \left|\frac{e^{4x} - e^{2x} + 1}{e^{4x} + e^{2x} + 1}\right| + C$

(2) $\frac{1}{2}\log_e \left|\frac{e^{2x} + e^x + 1}{e^{2x} - e^x + 1}\right| + C$

(3) $\frac{1}{2}\log_e \left|\frac{e^{2x} - e^x + 1}{e^{2x} + e^x + 1}\right| + C$

(4) $\frac{1}{2}\log_e \left|\frac{e^{4x} - e^{2x} + 1}{e^{4x} - e^{2x} + 1}\right| + C$

16. If $\int x^5\sqrt{\frac{1+x^2}{1-x^2}}dx = m\pi + n$, then the ordered pair (m,n) is equal to

(1) $\left(\frac{1}{3},\frac{1}{8}\right)$

(2) $\left(\frac{1}{8},\frac{2}{3}\right)$

(3) $\left(\frac{1}{4},\frac{1}{3}\right)$

(4) $\left(\frac{1}{8},\frac{1}{3}\right)$

17. The area (in sq. units) of the region bounded by the curve, $12y = 36 - x^2$ and the tangents drawn to it at the points, where the curve intersects the x-axis is

(1) 12

(2) 18

(3) 27

(4) 6

18. Let $y = y(x)$ be the solution of the differential equation :

$x\log^x \frac{dy}{dx} + y = 3x\log_e x, (x>1)$ if $y(e) = 0$, then $y(e^2)$ is equal to

(1) e^2

(2) $\frac{1}{2}e^2$

(3) $\frac{3}{2}e^2$

(4) $3e^2$

19. Let the straight lines, $5x-3y+15=0$ and $5x+3y-15$ form a triangle with the x-axis Then the radius of the circle circumscribing this triangle is

(1) $\frac{8}{5}$

(2) $\frac{17}{5}$

(3) $\frac{12}{5}$

(4) $\frac{16}{5}$

20. The mirror image of the circle $x^2+y^2-10x-10y=0$ in the line $x+y+5=0$ is a circle passing through the point

(1) $(-3,-7)$

(2) $(-9,-7)$

(3) $(-3,-11)$

(4) $(-9,-11)$

21. Let S the focus of the parabola, $x^2+8y=0$ and Q be any point on it. If P divides the line segement SQ in the ratio $1:2$, then the locus of P is

(1) $9x^2+24y+32=0$

(2) $9y^2+32=0$

(3) $32x^2+24x+32=0$

(4) $32y^2+27x+36=0$

22. Let $\theta \in \left(0, \frac{\pi}{2}\right)$ If the eccentricity of the hyperbola $x^2 - \cos^2\theta - y^2 = 6\cos^2\theta$ is $\sqrt{3}$ times the eccentricity of the ellipse $x^2 + y^2\cos^2\theta$ then θ is equal to

(1) $\frac{\pi}{6}$

(2) $\frac{\pi}{4}$

(3) $\cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$

(4) $\frac{\pi}{3}$

23. If the line $\frac{x-1}{4} = \frac{y+3}{2} = \frac{z+5}{1}$ lies in the plane $2x + ly + mz = 16$, then $l^2 + m^2$ is equal to

(1) 16

(2) 20

(3) 98

(4) 85

24. The equation of the plane passing through the line of intersection of the planes $\vec{r}\cdot\left(2\hat{i} - 3\hat{j} + 4\hat{k}\right) = 1$ $\vec{r}\cdot\left(\hat{i} - \hat{j}\right) + 4 = 0$ and perpendicular to the plane $\vec{r}\cdot\left(2\hat{i} - \hat{j} - \hat{k}\right) + 4 = 0$, is :

(1) $\vec{r}\cdot\left(\hat{i} - 2\hat{j} + 4\hat{k}\right) = 3$

(2) $\vec{r}\cdot\left(\hat{i} - 2\hat{j} + 4\hat{k}\right) = 5$

(3) $\vec{r}\cdot\left(2\hat{i} - \hat{j} + 5\hat{k}\right) = 3$

(4) $\vec{r}\cdot\left(2\hat{i} - \hat{j} + 5\hat{k}\right) = 5$

25. If $\hat{a},\hat{b},\hat{c}$ be three unit vectors, $\hat{b}$ and $\hat{c}$ are non-parallel, such that $\hat{a}\times\left(\hat{b},\hat{c}\right)=\frac{\hat{b}+\hat{c}}{2}$, then the angle between $\hat{a}$ and $\hat{b}$ is :

(1) $\frac{\pi}{6}$

(2) $\frac{2\pi}{3}$

(3) $\frac{\pi}{4}$

(4) $\frac{3\pi}{4}$

26. A box contains 6 red ball and 2 black balls. Two balls are drawn, at random, from it without replacement. if X denotes the number of red balls drawn then $E\left(X\right)$ is equal to :

(1) $\frac{3}{2}$

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

(3) $\frac{5}{2}$

(4) $\frac{27}{28}$

27. A six faced die is so biased that it is thrice likely to show an even number than an odd number, when thrown. If the die is thrown twice, the probability that sum of the numbers on the die is even is :

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

(2) $\frac{5}{8}$

(3) $\frac{7}{9}$

(4) $\frac{3}{8}$

28. The total number of $x \in [0, 2\pi]$ which satisfy the equation $4\left(\cos^{10} x + \sin^2 x\right) = 4 + \sin^6 x \sin^2(2x)$, is :

(1) 2

(2) 3

(3) 5

(4) 6

29. $\tan\left(\frac{1}{2}\sin^{-1}\frac{4}{5} + \frac{1}{2}\cos^{-1}\frac{15}{17}\right)$ is equal to :

(1) $\frac{6}{7}$

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

(3) $\frac{4}{15}$

(4) $\frac{9}{22}$

30. The Boolean expression $(p \wedge q) \vee ((\sim q) \vee p)$ is equivalent to :

(1) $\sim p \vee q$

(2) $\sim q \vee p$

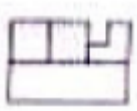
(3) $p \vee q$

(4) $(\sim p) \vee (\sim q)$

Part-II Aptitude Test

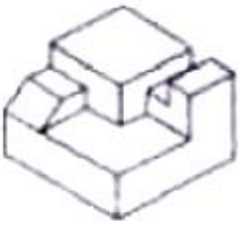
Directions (For Q. NO 31 to 34)

For the elevation given in the problem figure identify the correct 3-D figure from amongst the answer figure.

31. 

(1) 

(2) 

(3) 

(4) 

32. 

(1) 

(2) 

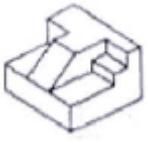
(3) 

(4) 

33. 

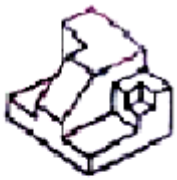
(1) 

(2) 

(3) 

(4) 

34. 

(1) 

(2) 

(3) 

(4) 

Directions (For Q. NO 35 to 37)

The 3-D figure shows the view of an object. Identity the correct top view from amongst the answer figures.

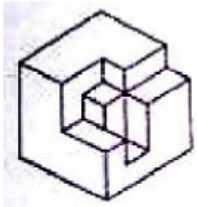
35. 

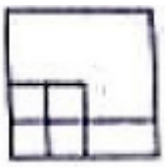
(1) 

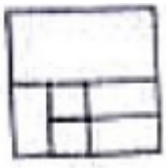
(2) 

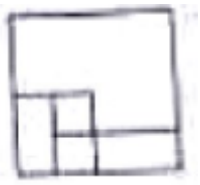
(3) 

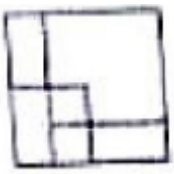
(4) 

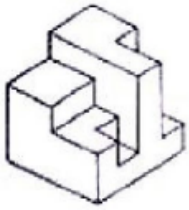
36. 

(1) 

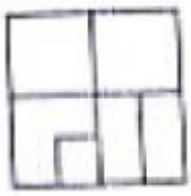
(2) 

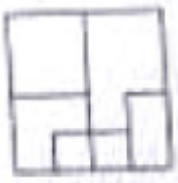
(3) 

(4) 

37. 

(1) 

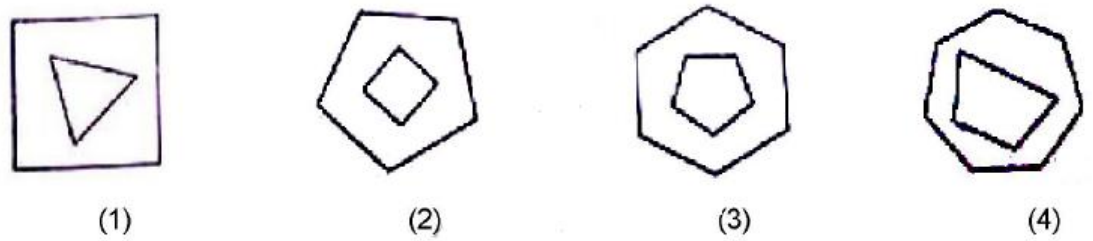
(2) 

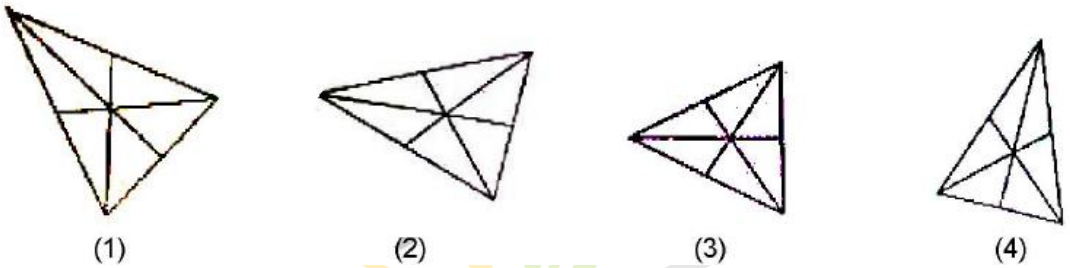
(3) 

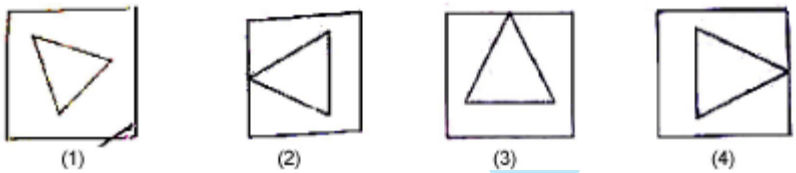
(4) 

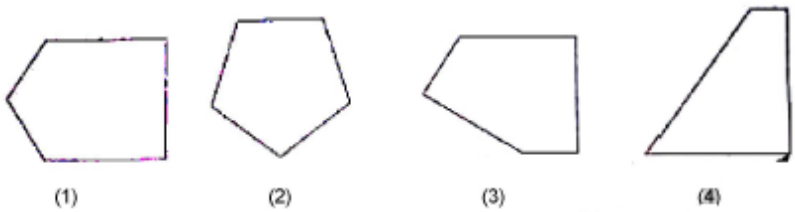
Directions (For Q. NO 38 to 41)

Find the odd figure out of the problem figures given below.

38. 

39. 

40. 

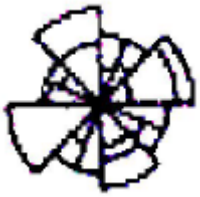
41. 

Direction : (For Q. No. 42 to 47)

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

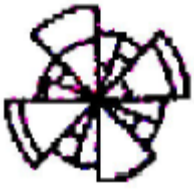
Problem Figures/Answer Figures

42.    ?

(1) 

(2) 

(3) 

(4) 

43.   ?

(1) 

(2) 

(3) 

(4) 

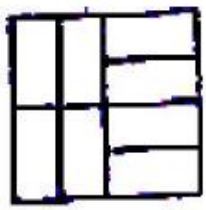
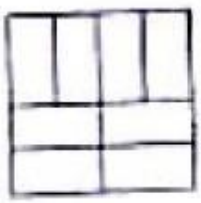
44.    ?

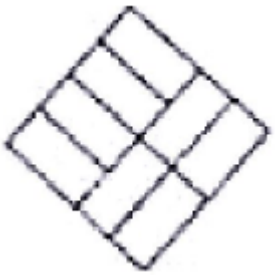
(1) 

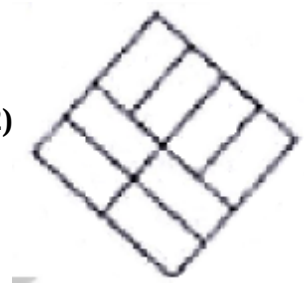
(2) 

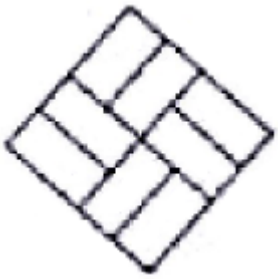
(3) 

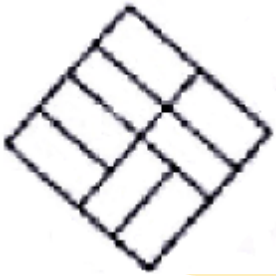
(4) 

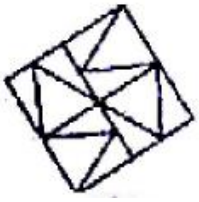
45.    **?**

(1) 

(2) 

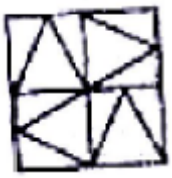
(3) 

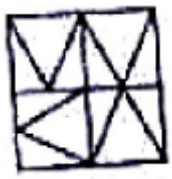
(4) 

46.    ?

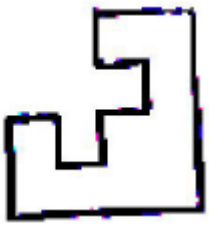
(1) 

(2) 

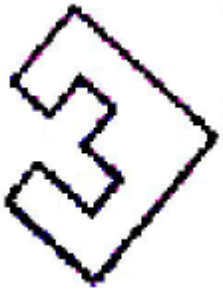
(3) 

(4) 

47. 

(1) 

(2) 

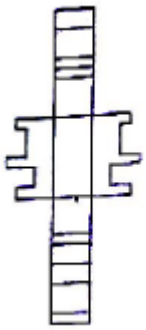
(3) 

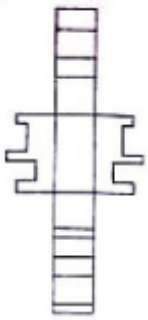
(4) 

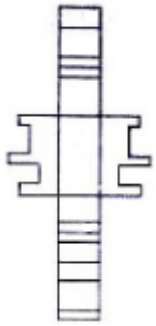
Direction : (For Q. No. 48 to 53)

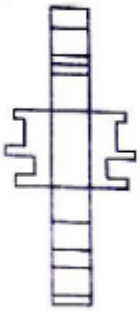
Which one of the answer figures shows the correct view of the 3-D problem figure after the problem figure is opened up?

48. 

(1) 

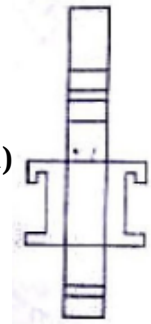
(2) 

(3) 

(4) 

49.

(1)



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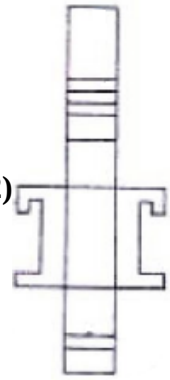

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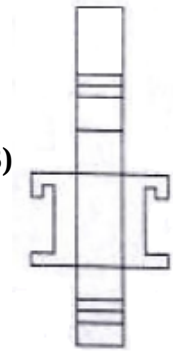
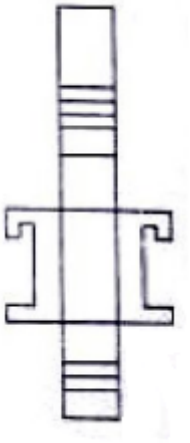
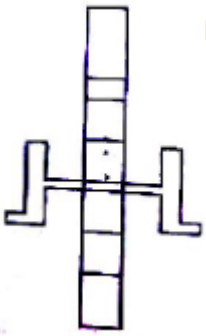
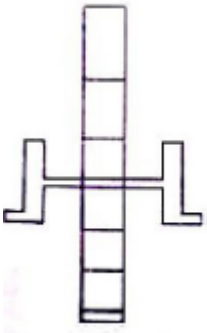
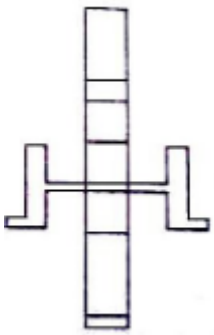


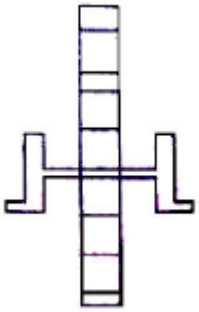
(4) 

50. 

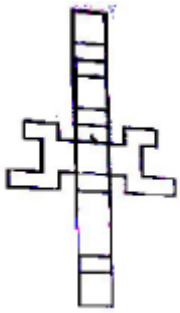
(1) 

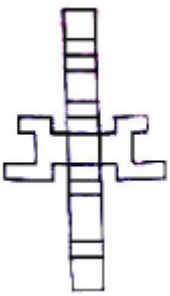
(2) 

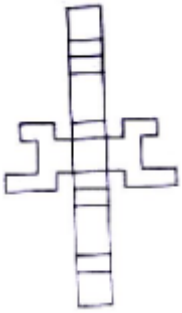
(3) 

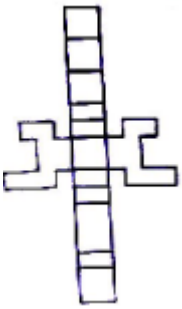
(4) 

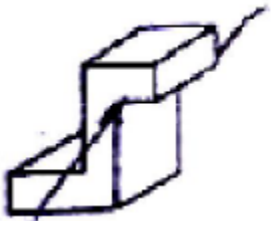
51. 

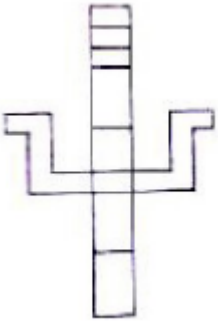
(1) 

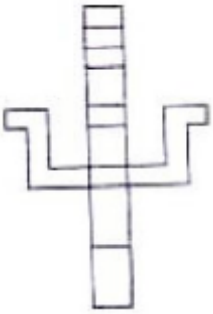
(2) 

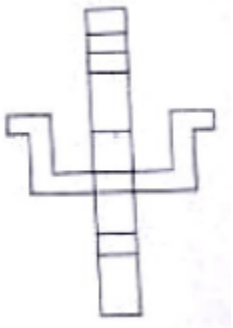
(3) 

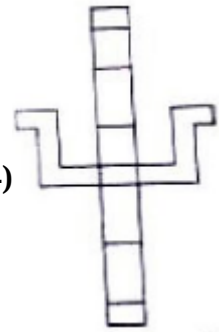
(4) 

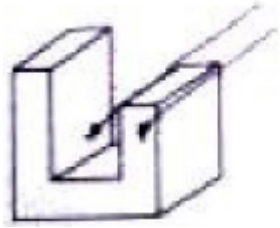
52. 

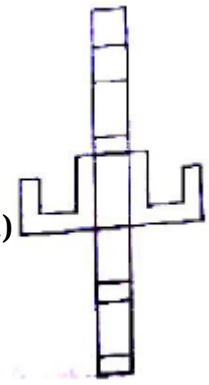
(1) 

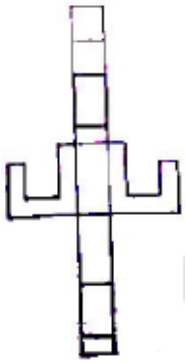
(2) 

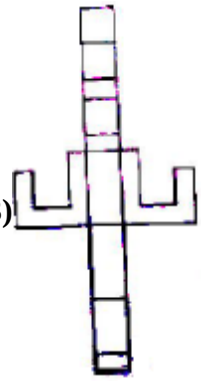
(3) 

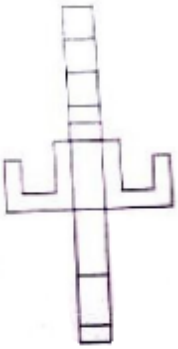
(4) 

53. 

(1) 

(2) 

(3) 

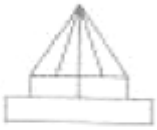
(4) 

Directions (For Q. No. 54 to 57)

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.

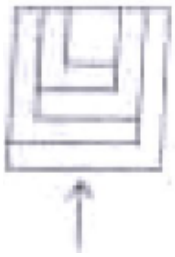
54. 

(1) 

(2) 

(3) 

(4) 

55. 

(1) 

(2) 

(3) 

(4) 

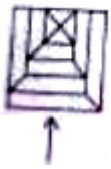
56. 

(1) 

(2) 

(3) 

(4) 

57. 

(1) 

(2) 

(3) 

(4) 

Directions (For Q. No. 58 to 61)

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

58. 

(1) 

(2) 

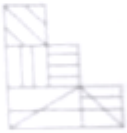
(3) 

(4) 

59. 

(1) 

(2) 

(3) 

(4) 

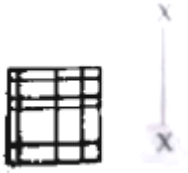
60. 

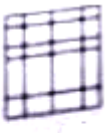
(1) 

(2) 

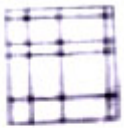
(3)

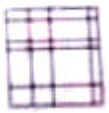
(4)

61. 

(1) 

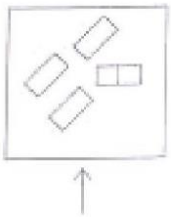
(2) 

(3) 

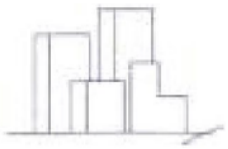
(4) 

Direction (For Q. No 62 to 65)

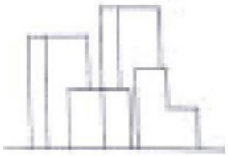
The problem figure shows the top view of objects. Looking in the direction of the arrow, identify the correctelevation, from amongstthe answer figures.

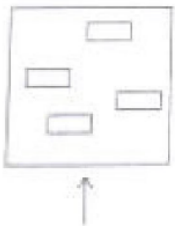
62. 

(1) 

(2) 

(3) 

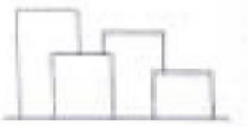
(4) 

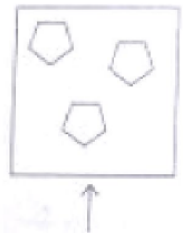
63. 

(1) 

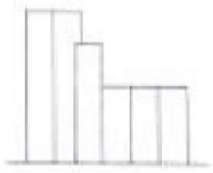
(2) 

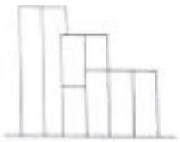
(3) 

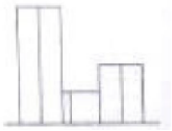
(4) 

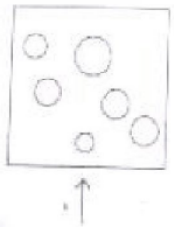
64. 

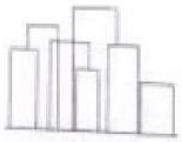
(1) 

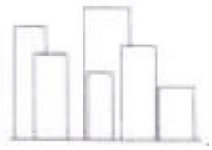
(2) 

(3) 

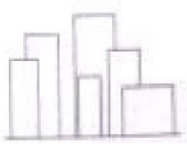
(4) 

65. 

(1) 

(2) 

(3) 

(4) 

66. Which out of the following is the country called the "Root of the world"?

(1) Japan

(2) Tibet

(3) Monogolia

(4) Uzbekistan

67. Which one of the following has a better insulation value?

(1) A concrete wall

(2) A brick wall

(3) A cavity wall

(4) A stone wall

68. Which one of the following is a renewable source of energy?

(1) coal

(2) Natural Gas

(3) Ocean waves

(4) Oil

69. Charles correa was which of the following ?

(1) A british Architect

(2) An Indian Architect

(3) An American Architect

(4) A Brazilian Architect

70. Who amongst the following is not a qualified architect?

(1) Remo fernandes

(2) Arundhati Roy

(3) Satish Gujral

(4) B. V. Doshi

71. Ellora group of temples represent which of the following ?

(1) Hindu Religion

(2) Buddhist Religion

(3) Jain Relision

(4) All of the oabove

72. 72. parthenon is located in which country?

(1) Romania

(2) Russia

(3) Greece

(4) Japan

73. Which of the following is equivalent to the Nobel prize in architecture ?

(1) Academy Award

(2) padma shree

(3) Pritzker Prize

(4) Star of Architecture

74. An escalator looks like which one of the following ?

(1) Ladder

(2) Staircase

(3) Ramp

(4) Lift

75. Who amongst the following is an architect ?

(1) Vikram Singh

(2) Lauri Baker

(3) Khushwant Singh

(4) Ruskin Bond

76. Burj Khalifa is located in which one of the following countries ?

(1) Saudi Arabia

(2) Dubai

(3) Turkey

(4) Afghanistan

77. Which of the following is the most striking feature of the Sydney Opera House ?

(1) Entrance Hall

(2) Interior Design

(3) Sail shaped roof

(4) Location

78. Which one of the following is an odd combination ?

(1) Forts and Jaipur

(2) Lakes and Udaipur

(3) Temples and Madurai

(4) Rain and Kutch

79. Tsunami is a result of which of the following ?

(1) Sea storms

(2) Earthquakes in coastal areas

(3) Earthquakes in the sea bed

(4) Strong ocean waves

80. Chandigarh was planned by an architect who was which of the following ?

(1) American

(2) French

(3) German

(4) Australian