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Solutions All India Test Series

Test-6

PHYSICS

1. (4)
2. (4)
3. (1)
4. (1)
5. (2)
6. (4)
7. (2)
8. (3)
9. (3)
10. (2)
11. (1)
12. (1)
13. (1)
14. (1)
15. (4)
16. (3)
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22. (2)
23. (1)
24. (4)
25. (1)
26. (1)
27. (4)
28. (2)
29. (2)
30. (2)

CHEMISTRY

31. (2)
32. (2)
33. (1)
34. (4)
35. (3)
36. (3)
37. (1)
38. (3)
39. (4)
40. (4)
41. (1)
42. (1)
43. (4)
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45. (3)
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53. (2)
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55. (2)
56. (1)
57. (3)
58. (4)
59. (1)
60. (4)

MATHEMATICS

61. (1)
62. (2)
63. (2)
64. (1)
65. (3)
66. (2)
67. (2)
68. (2)
69. (4)
70. (3)
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86. (3)
87. (4)
88. (2)
89. (2)
90. (4)

PHYSICS

1. Answer (4)

$$R = \frac{mv}{qB} = \frac{\sqrt{2km}}{qB}$$

$$\Rightarrow R \propto \frac{\sqrt{m}}{q}$$

 α -particle

Proton

Deuteron

$$R \propto \frac{\sqrt{m}}{q}$$

$$R \propto \frac{\sqrt{m}}{q}$$

$$R \propto \frac{\sqrt{2m}}{q}$$

2. Answer (4)

3. Answer (1)

$$10 = 5 \frac{di}{dt}$$

$$I = 2t$$

4. Answer (1)

$$Td\theta = I \times R d\theta \times B$$

$$\Rightarrow T = IRB$$

5. Answer (2)

$$\text{Since } \vec{B} \parallel \vec{dl}$$

6. Answer (4)

Since $\phi = \text{constant}$ through the loop.

7. Answer (2)

$$\langle I^2 \rangle = \frac{\int_0^2 I^2 dt}{\int_0^2 dt} = \frac{\int_0^2 4t^2 dt}{\int_0^2 dt} = 4 \times \frac{4}{3} = \frac{8}{3}$$

$$\therefore I_{\text{R.M.S}} = \sqrt{\langle I^2 \rangle} = \frac{4}{\sqrt{3}}$$

8. Answer (3)

9. Answer (3)

10. Answer (2)

11. Answer (1)

12. Answer (1)

13. Answer (1)

14. Answer (1)

15. Answer (4)

16. Answer (3)

17. Answer (1)

18. Answer (3)

19. Answer (1)

20. Answer (1)

21. Answer (3)

22. Answer (2)

23. Answer (1)

24. Answer (4)

25. Answer (1)

$$F_m = \frac{vB^2 l^2}{R} = \frac{10 \times 4 \times 1}{2} = 20 \text{ N}$$

$$F_g = mg = 20 = 20 \text{ N}$$

$$\therefore F_{\text{net}} = 0$$

$$\Rightarrow v = \text{constant}$$

$$\therefore v = 10 \text{ m/s}$$

26. Answer (1)

27. Answer (4)

28. Answer (2)

29. Answer (2)

$$F = i\vec{l} \times \vec{B}$$

$$= 2 \times 10^{-3} (-\hat{j}) \times (0.5\hat{i} + 0.3\hat{j})$$

$$= 10^{-3} \hat{k} \text{ N}$$

30. Answer (2)

$$r = \frac{\sqrt{2km}}{eB}$$

$$r' = \frac{\sqrt{2 \times 2km}}{e \times 3B}$$

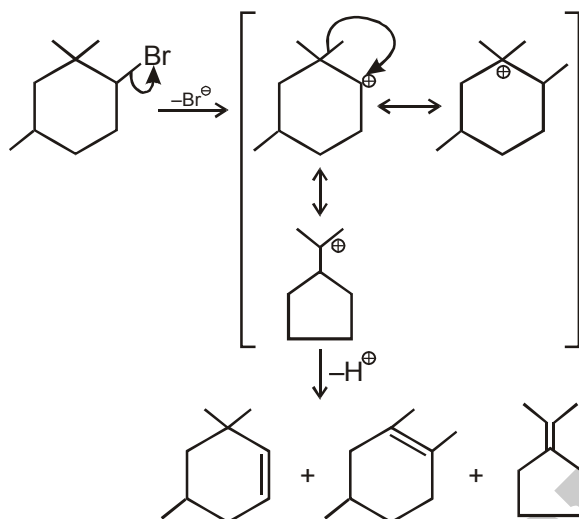
$$r' = \frac{\sqrt{2}}{3} r$$

CHEMISTRY

31. Answer (2)
 32. Answer (2)
 33. Answer (1)
 34. Answer (4)
 35. Answer (3)
 36. Answer (3)

Cr^{2+} is reducing agent as its configuration changes from d^4 to d^3 , the latter having a half filled t_{2g} level. On the other hand, the change from Mn^{3+} to Mn^{2+} results in the half-filled (d^5) configuration which has extra stability.

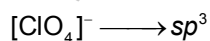
37. Answer (1)
 38. Answer (3)



39. Answer (4)
 40. Answer (4)

Sulphonic acid and p-nitrophenol being acidic, form salts with NaHCO_3 , and the resultant H_2CO_3 get decomposed to H_2O and CO_2 .

41. Answer (1)
 42. Answer (1)
 43. Answer (4)
 44. Answer (4)

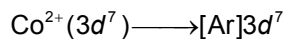


45. Answer (3)

Oxidation number of central metal is

$$2 + x - 4 = 0$$

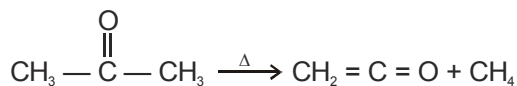
$$x = + 2$$



Number of unpaired electron = 3

$$\text{Spin magnetic of cobalt} = \sqrt{3(3+2)} \\ = \sqrt{15}$$

46. Answer (1)



47. Answer (1)

48. Answer (3)

It does not act as bidentate ligand because when it acts as bidentate ligand, a three membered (chelate complex) ring will be formed, that will be unstable.

49. Answer (1)



50. Answer (4)

51. Answer (2)

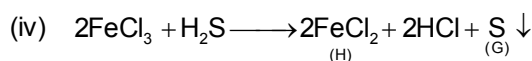
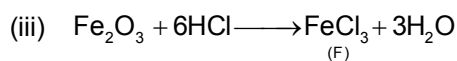
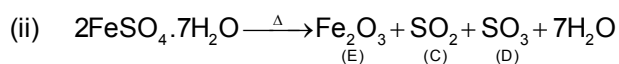
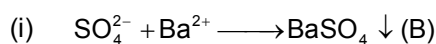
52. Answer (2)

53. Answer (2)

54. Answer (2)

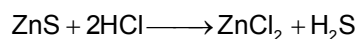
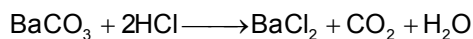
Solution of Q.No. 52 to 54

A is $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ (green vitriol)



In this Fe^{3+} is reduced to Fe^{2+} .

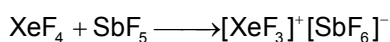
55. Answer (2)



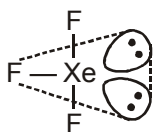
Ba^{2+} and Zn^{2+} salts are white or colourless in solution state with HCl.

56. Answer (1)

57. Answer (3)



In this reaction, $[\text{XeF}_3]^+$ is formed. Hybridization of Xe is sp^3d



58. Answer (4)

59. Answer (1)

60. Answer (4)

61. Answer (1)

We have,

$$\frac{\sin x}{x} < 1$$

$$\Rightarrow \lim_{x \rightarrow 0} \left[\frac{\sin x}{x} \right] < 1$$

62. Answer (2)

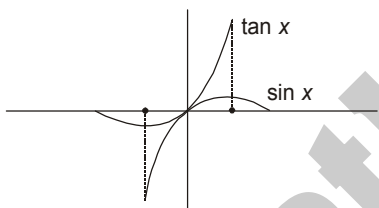
$$f'(x) = e^x g'(x) + e^x g(x)$$

$$f'(0) = g'(0) + g(0)$$

$$= 1 + 2$$

$$= 3$$

63. Answer (2)



Function is non-differentiable at $x = \pi/2$

it is clearly differentiable at $x = 0$

64. Answer (1)

65. Answer (3)

$$\text{Slope of normal} = -\frac{1}{\frac{dy}{dx}}$$

$$= \tan \frac{3\pi}{4} = -1$$

$$\frac{dy}{dx} = 1 \text{ so, } f'(5) = 1$$

MATHEMATICS

66. Answer (2)

67. Answer (2)

We have,

$$f'(x) = 3x^2 - 12x + 9$$

$$= 3(x-3)(x-1)$$

Since $f(x)$ is decreasing so $f'(x) < 0$

$$\Rightarrow 3(x-1)(x-1) < 0$$

$$\Rightarrow (x-3)(x-1) < 0$$

$$\Rightarrow x \in (1, 3)$$

68. Answer (2)

$$f'(x) = 3kx^2 - 18x + 9$$

$$f'(x) > 0$$

$$3kx^2 - 18x + 9 > 0$$

$$k > 0 \text{ \& } 36 - 12k < 0$$

$$k > 3$$

69. Answer (4)

$$\text{Maximum value of } (\sin^{-1} x)^4 + (\cos^{-1} x)^4 = \frac{17\pi^4}{16};$$

which occurs when $x = -1$

$$\text{and minimum value of } (\sin^{-1} x)^4 + (\cos^{-1} x)^4 = \frac{\pi^4}{128};$$

$$\text{which occurs at } x = \frac{1}{\sqrt{2}}$$

so, the required sum of maximum and minimum value

$$= \frac{17\pi^4}{16} + \frac{\pi^4}{128} = \frac{137\pi^4}{128}$$

70. Answer (3)

$$y^2 = 2x \Rightarrow \frac{dy}{dx} = \frac{1}{y}$$

$$x^2 = 2y \Rightarrow \frac{dy}{dx} = x$$

Again at origin $\frac{dy}{dx}$ for first curve = $\frac{1}{0} \rightarrow \infty$

So, tangent is parallel to y-axis and in case of second curve tangent is parallel to x-axis

$$\text{So, angle between curves} = \frac{\pi}{2} - 0 = \frac{\pi}{2}$$

71. Answer (2)
72. Answer (3)
73. Answer (4)
74. Answer (2)
75. Answer (1)
76. Answer (4)
77. Answer (2)
78. Answer (2)
79. Answer (4)
80. Answer (3)

$$3 - 2 \sin x + 2 \cos^2 x$$

$$3 - 2 \sin x + 2 - 2 \sin^2 x$$

$$5 - 2 \sin x - 2 \sin^2 x$$

$$5 + \frac{1}{2} - 2 \left(\sin x + \frac{1}{2} \right)^2$$

$$= \frac{11}{2} - 2 \left(\sin x + \frac{1}{2} \right)^2$$

So, maximum value will be at $x = -\pi/6$

81. Answer (3)
82. Answer (3)
83. Answer (2)
84. Answer (1)
85. Answer (2)
86. Answer (3)
87. Answer (4)
88. Answer (2)
89. Answer (2)
90. Answer (4)

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