

KISHORE VAIGYANIK PROTSAHAN YOJANA - 2014

Date : 02-11-2014

Duration : 3 Hours

Max. Marks : 160

STREAM - SB/SX

GENERAL INSTRUCTIONS

- The Test Booklet consists of **120** questions.
- There are Two parts in the question paper. The distribution of marks subjectwise in each part is as under for each correct response.

MARKING SCHEME :

PART-I :

MATHEMATICS

Question No. **1 to 20** consist of **ONE (1)** mark for each correct response.

PHYSICS

Question No. **21 to 40** consist of **ONE (1)** mark for each correct response.

CHEMISTRY

Question No. **41 to 60** consist of **ONE (1)** mark for each correct response.

BIOLOGY

Question No. **61 to 80** consist of **ONE (1)** mark for each correct response.

PART-II :

MATHEMATICS

Question No. **81 to 90** consist of **TWO (2)** marks for each correct response.

PHYSICS

Question No. **91 to 100** consist of **TWO (2)** marks for each correct response.

CHEMISTRY

Question No. **101 to 110** consist of **TWO (2)** marks for each correct response.

BIOLOGY

Question No. **111 to 120** consist of **TWO (2)** marks for each correct response.



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PART-I

One Mark Questions

MATHEMATICS

1. **Sol-** Let a, a_1, a_2, \dots be the length of side of square inscribed in circle c_0, c_1, c_2, \dots and r_1, r_2, r_3, \dots be radius of circle c_1, c_2, \dots then, $a_0^2 = 2 = \pi r_1^2$

$$r_1 = \sqrt{\frac{2}{\pi}}$$

$$2a_1^2 = \frac{8}{\pi}$$

$$a_1^2 = \frac{4}{\pi} = \pi r_2^2$$

$$r_2 = \frac{2}{\pi}$$

$$\sum_{i=0}^{\infty} \text{Area}(C_i) = \pi \cdot i$$

$$= \pi + 2 + \frac{4}{\pi} + \frac{8}{\pi^2} = \frac{\pi}{1 - \frac{2}{\pi}} = \frac{\pi^2}{\pi - 2}$$

Ans. (D)

2. **Sol. (A)** $[x + y] \leq [x] + [y]$

$$\text{for } x = \frac{3}{2}, y = \frac{5}{3}$$

$$\left[\frac{3}{2} + \frac{5}{3} \right] \leq \left[\frac{3}{2} \right] + \left[\frac{5}{3} \right]$$

$$\Rightarrow \left[\frac{9+10}{6} \right] \leq 1+1$$

$$\Rightarrow 3 \leq 2 \text{ false}$$

$$\text{(B)} [xy] \leq [x][y]$$

$$\text{for } x = \frac{3}{2}, y = \frac{5}{3}$$

$$\left[\frac{15}{6} \right] \leq 1 \times 1$$

$$\Rightarrow 2 \leq 1 \text{ false}$$

$$\text{(C)} [2^x] \leq 2^{[7/2]}$$

$$\text{for } x = 7/2$$

$$[2^{7/2}] \leq 2^{[7/2]}$$

$$\Rightarrow [(128)^{1/2}] \leq 2^3$$

$$\Rightarrow 11 \leq 8 \text{ false}$$

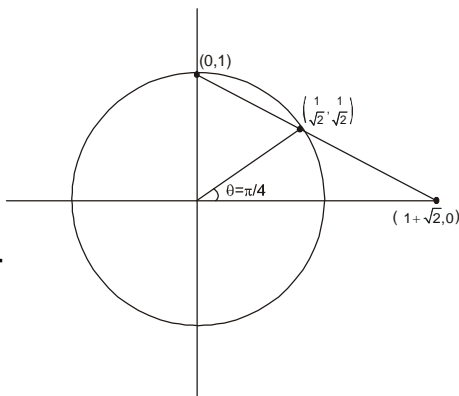
$$\therefore \text{(D)} \left[\frac{x}{y} \right] \leq \frac{[x]}{[y]} \text{ true } \forall x \in R$$

Ans. (A)

3. $A_n = {}^n C_r$ max
 case-I $n = 2k$ (even) $\Rightarrow A_n = {}^{2k} C_k$
 $\Rightarrow n - 1 = 2k - 1$ (odd) $\Rightarrow A_{n-1} = {}^{2k-1} C_{k-1}$ or ${}^{2k-1} C_k$
 $\Rightarrow 1.9 \leq \frac{A_n}{A_{n-1}} \leq 2$
 $\Rightarrow 1.9 \leq \frac{{}^{2k} C_k}{{}^{2k-1} C_{k-1}} \leq 2$
 $\Rightarrow 1.9 \leq 2 \leq 2$ which is true for every $n = \text{even}$
 $n = 2, 4, 6, \dots, 20 \Rightarrow 10$ numbers
 case-II $n = (2k - 1)$ (odd)
 $A_n = {}^{2k-1} C_k$ or ${}^{2k-1} C_{k-1}$
 $\Rightarrow A_{n-1} = {}^{2k-2} C_{k-1}$
 $\therefore 1.9 \leq \frac{A_n}{A_{n-1}} \leq 2$
 $1.9 \leq \frac{{}^{2k-1} C_k}{{}^{2k-2} C_{k-1}} \leq 2.0$
 $1.9 \leq \frac{2k-1}{k} \leq 2$
 $1.9k \leq 2k - 1 \leq 2k$
 $10 \leq k$
 $\Rightarrow n \geq 19$
 $\Rightarrow n = 19$ only
 total = 11
Ans-(C)

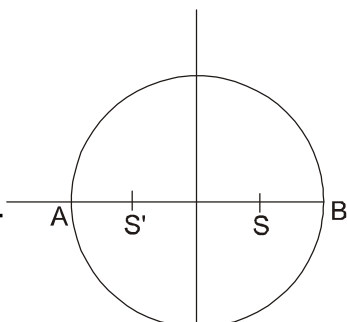
4. **Ans-(B)**

5. **Sol-**



Ans - (B)

6. **Sol-**



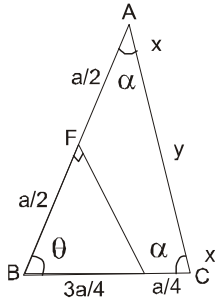
$$AS' = SS' = SB$$

$$\Rightarrow e = 1/3$$

$$\Rightarrow a = 3$$

Ans - (D)

7. **Sol-** AB=BC



$$\cos \theta = \frac{2}{3} \text{ and } \sin \frac{\theta}{2} = \frac{1}{\sqrt{6}}$$

$$2\alpha = \pi - \theta \quad \cos \alpha = \sin \frac{\theta}{2} = \frac{1}{\sqrt{6}}$$

$$\cos \alpha = \frac{y}{2a} = \frac{1}{\sqrt{6}}$$

$$\frac{a}{y} = \sqrt{\frac{3}{2}}$$

Ans - (C)

8.
$$\cos^4 x + \frac{1}{\cos^2 x} = \sin^4 x + \frac{1}{\sin^2 x}$$

$$\Rightarrow \cos^4 x - \sin^4 x = \frac{1}{\sin^2 x} - \frac{1}{\cos^2 x}$$

$$\Rightarrow (\cos^2 x - \sin^2 x) \cdot 1 = \frac{\cos^2 x - \sin^2 x}{\sin^2 x \cdot \cos^2 x}$$

$$\Rightarrow \cos 2x \left[1 - \frac{1}{\sin^2 x \cdot \cos^2 x} \right] = 0$$

$$\Rightarrow \cos 2x = 0$$

$$2x = t, \quad t \in [0, 4\pi]$$

$$\sin^2 x \cdot \cos^2 x = 1$$

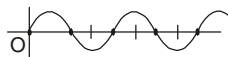
$$\sin^2 x (1 - \sin^2 x) = 1$$

$$\Rightarrow t(1-t) = 1$$

$$\Rightarrow t - t^2 = 1$$

$$\Rightarrow t^2 - t + 1 = 0$$

$$D < 0$$



9. **Sol.** $f(x) = \begin{cases} \frac{x+5}{x-2}, & x \neq 2 \\ 1, & x = 2 \end{cases}$

$f(x)$ is discontinuous at $x = 2$

$f(x) = 2$

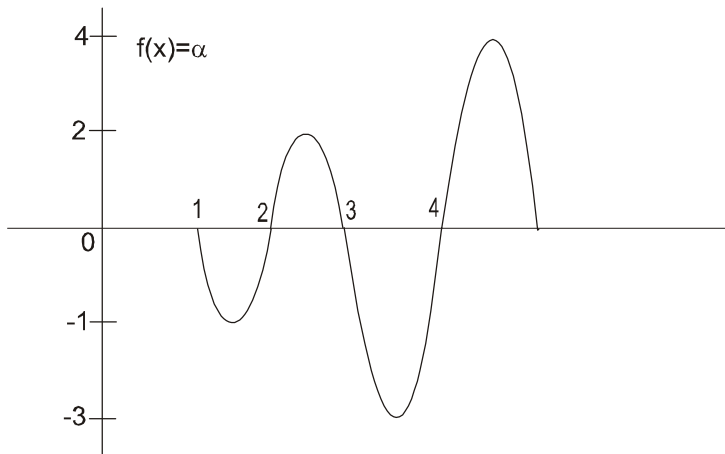
$\Rightarrow \frac{x+5}{x-2} = 2$

$\Rightarrow x+5 = 2x-4$

$\Rightarrow x = 9$

Ans(B)

10. **Sol-** $f(x) = [x] \sin \pi x$

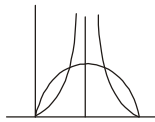


Ans - (D)

11. **Sol.** $\sin x = \tan^2 x$
 $\sin^2 x = \sin x (1 - \sin^2 x)$
 $\sin x (\sin^2 x + \sin - 1) = 0$

$\sin x = 0$ $\sin x = \frac{\sqrt{5}-1}{2}$

$x = 0, \pi$ $\sin^{-1} \frac{\sqrt{5}-1}{2}, \pi - \sin^{-1} \frac{\sqrt{5}-1}{2}$



Ans(B)

12. **Sol-** $I = \int_0^1 f(x^2) dx$

Let $x^2=t$

$$dx = \frac{1}{2\sqrt{t}} dt$$

$$I = \int_0^1 f(t) \frac{dt}{2\sqrt{t}}$$

$$\therefore \frac{1}{2} \leq \frac{1}{2\sqrt{t}}$$

$$\int_0^1 f(t) \frac{dt}{2} \leq \int_0^1 f(t) \frac{dt}{2\sqrt{t}} \quad 5 \leq I$$

Ans-(D)

13. **Sol.** $f'(x) = 1 + f(x) \quad f(0) = 0$

$$\frac{f(x)}{1+f(x)} = 1$$

$$\ln(1+f(x)) = x$$

$$\text{then } f(x+y) = f(x) + f(y) \quad f(x) f(y)$$

Ans(C)

14. **Sol.** $\int_0^n \cos(2\pi[x]\{xy\})$

$$n \int_0^1 \cos(2\pi[x]1) dx = n \int_0^1 1 dx = n$$

Ans(C)

15. **Sol-** $P(B) = 1 \cdot \frac{5}{6} + 1 \cdot \frac{1}{6} \cdot \frac{5}{6} + \dots = \frac{6}{7}$

Ans-(B)

16. $\mu = \frac{\sum x_i}{n} \quad n \geq 3$

$$\sigma = \sqrt{\frac{\sum x_i^2}{n} - \left(\frac{\sum x_i}{n}\right)^2}$$

$$\hat{\mu} = \frac{y_1 + y_2 + y_3 + \dots + y_n}{n}$$

$$= \frac{\frac{x_1 + x_2}{2} + \frac{x_1 + x_2}{2} + x_3 + x_4 + \dots + x_n}{n}$$

$$= \frac{x_1 + x_2 + \dots + x_n}{n} = \mu \quad \dots(1)$$

$$\hat{\sigma} = \sqrt{\frac{\left(\frac{x_1 + x_2}{2}\right)^2 + \left(\frac{x_1 + x_2}{2}\right)^2 + x_3^2 + \dots + x_n^2}{n} - \left(\frac{\sum y_i}{n}\right)^2}$$

$$= \sqrt{\frac{\frac{1}{4}(2x_1^2 + 2x_2^2 + 4x_1x_2) + x_3^2 + \dots + x_n^2}{n} - \left(\frac{\sum y_i}{n}\right)^2}$$

$$= \sqrt{\frac{\frac{1}{2}(x_1^2 + x_2^2) + x_1x_2 + x_3^2 + \dots + x_n^2}{n} - \left(\frac{\sum x_i}{n}\right)^2}$$

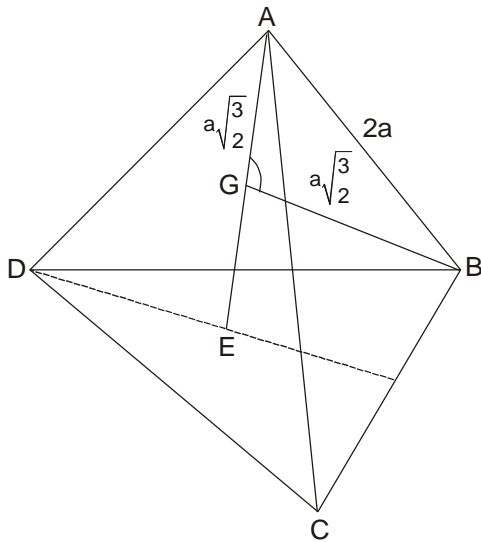
$$\leq \sqrt{\frac{x_1^2 + x_2^2 + \dots + x_n^2}{n} - \left(\frac{\sum x_i}{n}\right)^2}$$

$\hat{\sigma} \leq \sigma$ (2)
 by (1) and (2) (B) is correct

17. **Sol-** Let side length = 2a

$$\Rightarrow GA=GB=a\sqrt{\frac{3}{2}}$$

$$\therefore \cos\theta = -\frac{1}{3}$$



Ans-(C)

18. **Ans-(A)**

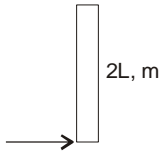
19. **Ans-(D)**

20. **Sol.** ${}^5C_2 2 + {}^5C_3 \frac{3}{1} + {}^5C_4 \left[\frac{4}{1} \frac{2}{3} + \frac{4}{1} \frac{2}{2} \right] + \frac{5}{1} \frac{2}{4} + \frac{5}{2} \frac{2}{3}$
 $20 + 10 \times 6 + 5[8 + 6] + 10 + 20 = 180$

Ans-(C)

PHYSICS

21.



$$J = mv$$

$$v_{Cm} = J/M$$

$$J.L = \frac{M(2L)^2}{12} \omega$$

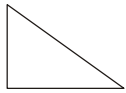
$$J.L = \frac{ML^2}{3} \omega$$

$$\omega = \frac{3J}{ML}$$

$$ke = \frac{J^2}{2m} + \frac{3J^2}{2m} = 2J^2/m$$

Ans. (C)

22.



$$mgh = \frac{1}{2} mv^2 + \frac{1}{2} I \omega^2$$

$$mgh = \frac{1}{2} mv^2 + \frac{1}{2} \cdot \frac{MR^2 \omega^2}{2}$$

$$gh = \frac{1}{2} mv^2 + \frac{1}{4} mv^2 = \frac{3}{4} v^2$$

$$v^2 = \sqrt{\frac{4gh}{3}}$$

$$V = \sqrt{\frac{4gh}{3}}$$

$$V = \sqrt{2gh}$$

$$\frac{V_p}{V_R} = \sqrt{\frac{4}{3 \times 2}} = \sqrt{2/3}$$

Ans. (C)

23. $V(r) = kr$

$$U(r) = mkr$$

$$\omega^2 = \frac{k}{r}$$

$$F = -\frac{du}{dr} = -mk$$

$$\omega = \sqrt{\frac{k}{r}}$$

$$T = \frac{2\pi\sqrt{r}}{\sqrt{k}}$$

Ans. (A)

24. Ans. (D)

25. $A_1 V_1 = A_2 V_2$

$$P + \frac{1}{2} \rho v^2 = \text{Const.}$$

$\rho = \text{density}$

$$P_1 V_1 = P_2 V_2$$

Ans. (B)

26. **Ans. (B)**

27. **Ans. (D)**

28. $PV^2 = C$
 $PV.V = K$
 $nRT.V = K$
 $VT = K$
 $V_1T_1 = V_2T_2$
 $V_1 > V_2 \quad T_2 < T_1$
 $P_1V_1^2 = P_2V_2^2$

$$\frac{V_2^2}{V_1^2} = \frac{P_1}{P_2}$$

$$P \cdot \frac{K^2}{T^2} = C$$

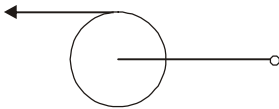
$$\frac{P}{T^2} = k$$

$$\frac{P_1}{T_1^2} = \frac{P_2}{T_2^2}$$

$$\frac{P_1}{P_2} = \frac{T_1^2}{T_2^2}$$

Ans. (B)

29.



$$n' = n \left[\frac{v - 0}{v + v_s} \right]$$

$$n'' = n \left[\frac{v}{v + v_s} \right]$$

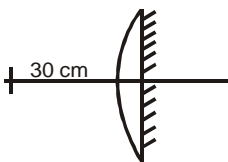
$$\frac{n'}{n''} = \frac{v - v_s}{v + v_s}$$

$$\frac{n'}{n''} = \frac{v + v_s}{v - v_s} = \frac{330 + 30}{330 - 30} = \frac{360}{300} = 1.2$$

Ans. (C)

30. **(A)**

31.



$$\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$$

$$\frac{1}{f} = \frac{1}{fm} - \frac{2}{fl}$$

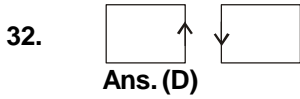
$$\frac{1}{f} = \frac{1}{\infty} - \frac{2}{10} = -\frac{1}{5}$$

$$f = -5$$

$$\frac{1}{v} + \frac{1}{-30} = -\frac{1}{5}$$

$$\begin{aligned} \frac{1}{v} - \frac{1}{5} + \frac{1}{30} \\ = \frac{-6+1}{30} = \frac{-5}{30} \\ v = -6\text{cm} \end{aligned}$$

Ans. (B)



$$v_y = ay.t$$

$$v_y = \frac{eE}{m} \cdot \frac{l}{u}$$

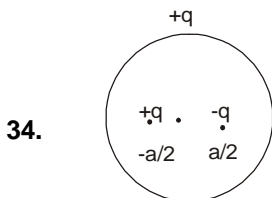
$$v_x = u$$

$$\tan \theta = \frac{eEl}{mu^2}$$

$$\frac{\tan \theta_1}{\tan \theta_2} = 4$$

$$\tan \theta_2 = \frac{\tan \theta_1}{4} = 0.1$$

Ans. (A)



$$W_1 = q \left(\frac{KQ}{R} \right)$$

$$W_2 = \left(\frac{KQ}{R} + \frac{kq}{a} \right) (-q)$$

$$W = \frac{-kq^2}{a}$$

Ans. (C)

35. $Q = \frac{C}{2}E$

$$Ceq = \frac{C.KC}{C+KC} = \frac{C^2K}{C(1+k)} = \frac{CK}{1+K}$$

$$Q = \frac{CK}{1+k}E$$

$$\Delta Q = \left(\frac{CK}{1+k} - \frac{C}{2} \right) E$$

$$\Delta Q = \left(\frac{CK}{1+k} - \frac{C}{2} \right) E$$

$$= \frac{2ck - c(k-1)}{2(1+k)}$$

$$= \frac{2ck - ck - c}{2(1+k)} = \frac{ck - c}{2(1+k)}$$

Ans. (B)

36. $V = ed$

$$E = \frac{100}{20\mu\text{m}}$$

$$V' = \frac{100}{20} \times 1 = 5\text{v}$$

Ans. (A)

37. $\frac{dN}{dt} = n\lambda$

$$\frac{dN}{dt} = \lambda dt$$

$$\frac{6.93}{6.9} \times 10^{-4}$$

$$= 10^{-4}$$

Ans. (D)

38. $\frac{N}{4\pi R^2}$

$$N = \frac{160 \times 6200 \times 10^{-10}}{6.62 \times 10^{-34} \times 3 \times 10^8}$$

$$= \frac{5 \times 10^{19} \times 10}{4 \times 3.14 \times 3.24} = \frac{16 \times 62 \times 10^{-7}}{20 \times 10^{-34} \times 10^8}$$

$$= \frac{5 \times 10^{19} \times 10}{4 \times 3.14 \times 3.24} = \frac{496}{10} \times 10^{19}$$

$$= 1.25 \times 10^{19}$$

Ans. (C)

39. $\frac{\lambda_1}{\lambda_2} = \frac{\frac{1}{2^2} - \frac{1}{3^2}}{\frac{1}{3^2} - \frac{1}{5^2}} = \frac{\frac{1}{4} - \frac{1}{9}}{\frac{1}{9} - \frac{1}{25}} = \frac{125}{64}$

$$\lambda_2 = \frac{125}{64} \lambda_1$$

Ans. (B)

40. $10 \times 8 = 80$
 $11 \times 7.5 = 82.5$
 Energy required = $82.5 - 80$
 $= 2.5$

Ans. (A)

CHEMISTRY

41. $K_{sp} \text{ AgBr} = (\text{Ag}^+) (\text{Br}^-) = (5 \times 10^{-10}) (10^{-3}) = 5 \times 10^{-13}$

Concentration of Br^- in 10^{-2}M aq $\text{AgNO}_3 = \frac{K_{sp} \text{ AgBr}}{[\text{Ag}^+]}$

$$= \frac{5 \times 10^{-13}}{(10^{-2})} = 5 \times 10^{-11} \text{m}$$

Ans. (D)

42. Over bromination take place in activated Aniline

Ans. (A)

43. +6 is maximum oxidation state of Cr

Ans. (D)

44. Ans. (C)

45. Al_2O_3 is amphoteric oxide

Ans. (C)

46. $\ln k = \ln A - \frac{E_a}{R} \times \frac{1}{T}$

Ans. (A)

47. $\text{Ni}(\text{CO})_4$ is tetrahedral with d^{10} configuration

Ans. (C)

48. Ozonolysis and intramolecular aldol

Ans. (A)

49. Ans. (B)

50.

Ans. (A)

51. When $Q_c > K_c$
Reaction move in backward direction

Ans. (A)

52. SN-1 Reaction, more stable carbocation is formed

Ans. (C)

53.

Ans. (D)

54. Wolf kishner Reduction

Ans. (B)

55. Compound is AsCl_3

Ans. (C)

56. Valency factor of $\text{KMnO}_4 = 5$
 $5e^- + \text{MnO}_4^- + 8\text{H}^+ \rightarrow \text{Mn}^{+2} + 4\text{H}_2\text{O}$

Ans. (D)

57. Ans. (C)

58. $\Delta S = \frac{\Delta H}{T} = \frac{6000 \text{J}}{273 \text{K}} \cong 22 \text{J/K.mol}$

Ans. (A)

59. Ullmann reaction

Ans. (A)

60. **Ans. (C)**
Energy of t_{2g} orbitals < e_g orbitals in octahedral complexes

BIOLOGY

61. (C) 62. (A) 63. (B) 64. (D) 65. (C) 66. (B) 67. (D)
68. (B) 69. (A) 70. (D) 71. (C) 72. (A) 73. (D) 74. (C)
75. (D) 76. (A) 77. (A) 78. (B) 79. (A) 80. (B)

PART-II Two Mark Questions

MATHEMATICS

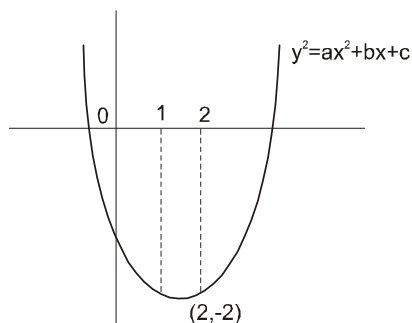
81. **Ans-(A)**

82.
$$\left| e^{\sum_{k=0}^n \binom{n}{k} w^k} \right| = \left| e^{(1+w)^n} \right| = \left| e^{(-w^2)^n} \right|$$

\therefore when n is multiplying of 3, then
 $S=e, 1/e$
when n is not multiple of three, then
 $s=e^{1/2}e^{-1/2}$

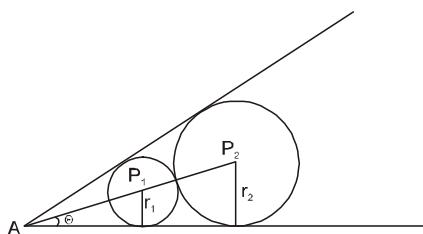
Ans-(C)

83. **Sol-** $y = ax^2 + bx + c$
 $a > 0, b < 0, c < 0$
Also $y(1) = a + b + c < 0$



Ans-(B)

- 84.



Sol- $\sin\theta = \frac{1}{\sqrt{3}} = \frac{r_1}{AP_1} = \frac{r_2}{AP_2}$

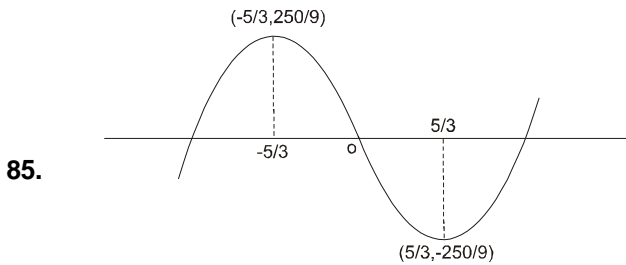
$$AP_2 = AP_1 + r_1 + r_2$$

$$r_2\sqrt{3} = r_1\sqrt{3} + r_1 + r_2$$

$$r_2(\sqrt{3} - 1) = r_1(\sqrt{3} + 1)$$

$$\frac{r_2}{r_1} = 2 + \sqrt{3}$$

Ans-(D)



Sol- Let $f(x) = 3x^3 - 25x$
 $f'(x) = 9x^2 - 25$

$$f'(x) = 0 \Rightarrow \pm \frac{5}{3}$$

$$f(-5/3) = 250/9 \approx 27.7$$

$$f(5/3) = -250/9 \approx -27.7$$

∴ n can take 55 values

Ans-(C)

86. Ans-()

87. Sol- $I_n = \int_0^{\pi/2} x^n \cos x dx$

$$\Rightarrow I_n + n(n-1)I_{n-2} = \left(\frac{\pi}{2}\right)^n \dots\dots(1)$$

Also $\sum_{n=2}^{\infty} \left(\frac{I_n}{n!} + \frac{I_{n-2}}{(n-2)!}\right) = \sum_{n=2}^{\infty} \left(\frac{I_n + (n-2)!!I_{n-2}}{n!}\right) = \sum_{n=2}^{\infty} \left(\frac{(\pi/2)^n}{n!}\right) = e^{\pi/2} - 1 - \frac{\pi}{2}$

Ans- (A)

88. Sol- $\int_1^n [x][\sqrt{x}]dx = \int_1^n 2dx + \dots\dots\dots$

$$= \begin{cases} 50 & \text{for } n = 8 \\ 66 & \text{for } n = 9 \end{cases}$$

Ans - (B)

89. Ans- (B), Check for n = 1, 2, 3,.....

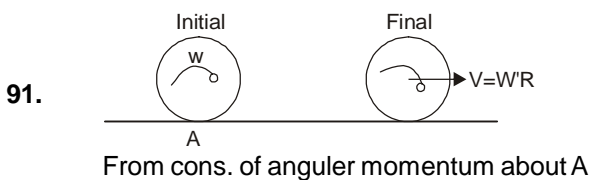
90. Sol- No correct Option

(1,17), (2,17), (3,17), (4,17), (4,17), (6,17), (7,17) ----- (16,17), (18,17) = 17 points
 Also (17,1), (17,2), ----- (17,16), (17,18) = 17 points

So there are more than 34 points.

Ans-()

PHYSICS

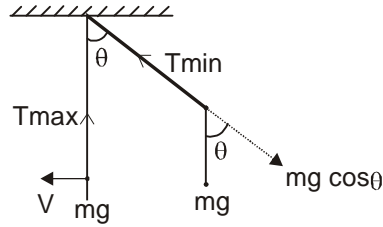


$$\Rightarrow v = \frac{2Rw}{7}$$

$$\Rightarrow W' = \frac{2w}{7}$$

Ans. (C)

92. Ans. (A)



93. $T_{\max} - mg = \frac{mv^2}{R} \dots(i)$

from energy cons.
 $k_i + u_i = k_f + u_f$

$$0 + mg(R - R \cos \theta) = \frac{1}{2}mv^2 + 0$$

$$V^2 = 2gR(1 - \cos \theta)$$

Put in eq. (i)

$$T_{\max} = 3mg - 2mg \cos \theta$$

$$\frac{T_{\max}}{T_{\min}} = 4$$

$$\theta = 60^\circ$$

Ans. (B)

94. Heat cap. is define as $C = C_v + \frac{R}{1-\gamma}$

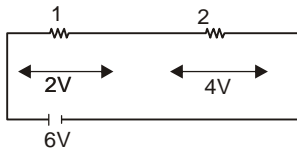
$$C = \frac{3}{2}R + \frac{R}{1-3} + R$$

Ans. (D)

95. Ans. (A)

96. Ans. (C)

97. At steady state capacitor will behave as open circuit



So charge store in $1 \mu F = 1 \times 4 = 4 \mu C$
 in $2 \mu F = 2 \times 4 = 8 \mu C$

Ans. B

98. $F = \frac{2P}{C}$

$$mg = \frac{2 \times 1.5 \times 10^3}{3 \times 10^8}$$

$$m = 10^{-6} \text{kg}$$

Ans. (D)

99. $E = \phi + eV$
 $E = \phi + e (.9)$
 $1.1E = \phi + e(.9)$
 $.1E = .3e$
 $E = 3eV$ put
 $\phi = 2.4eV$
- Ans. (B)
100. $(ML^{\circ}T^{-2}\theta^{-4}) = (ML^2T^{-1})^{\gamma} (ML^2T^{-2}\theta^{-1})^{\beta} (LT^{-1})^{\gamma}$
 Solving we get
- Ans. (C)

CHEMISTRY

101. Ans. (A)
102. $d = \frac{PM}{RT}$ $M = \frac{dRT}{P}$
 $M = 123$
 \therefore acetic acid exist as dimer
- Ans. (B)
103. $\Delta E = \Delta H - \Delta(PV) = \Delta H - \Delta n_g RT$
- Ans. (D)
104. Ans. (C)
105. $N_2(g) + 2H_2(g) \rightarrow N_2H_4(g)$
 $\Delta = \sum(BDE)_{\text{Reacant}} - \sum(BDE)_{\text{Products}}$
- Ans. (B)
106. $V_{K^+} + V_{Cl^-} = 133 + 181$
 KCl form FCC Lattice
 $\therefore 2(V_{K^+} + V_{Cl^-}) = a = \text{edge length of unit cell}$
 $V = a^3$
- Ans. (C)
107. $K_2Cr_2O_7 + 6FeSO_4 + 7H_2SO_4 \rightarrow Cr_2(SO_4)_3 + 3Fe_2(SO_4)_3 + K_2SO_4 + 7H_2O$
- Ans. (B)
108. $E^{\circ}_{\text{Cell}} = \text{SRP cathode} - \text{SRP anode}$
 $= -0.44 - (-0.74) = 0.3V$
 $\Delta G = -nF E^{\circ}_{\text{Cell}}$ ($n = 6 \text{ ele}^-$)
- Ans. (C)
109. Ans. (A)
110. $XeF_6 + 3H_2O \rightarrow XeO_3 + 6HF$
 XeO_3 is sp^3 hybrid and pyramidal
- Ans. (C)

BIOLOGY

111. (B) 112. (D) 113. (D) 114. (A) 115. (C) 116. (D) 117. (C)
118. (B) 119. (A) 120. (A)