HSSC MOCK TEST – 172 (SOLUTION)

1. (B) Let Probability of success (p) = $\frac{1}{3}$

and probability of unsuccess (q) = $\frac{2}{3}$

Let x is random variable which show for solving 5 questions. It is clear that

x ~ binomial distribution $\left(5, \frac{1}{3}\right)$

$\therefore P(X = x) = {}^5C_x \left(\frac{1}{3}\right)^x \left(\frac{2}{3}\right)^{5-x}$

(where $k = 0, 1, ...5$)

$\therefore$ Required Probability

$P(X \geq 3) = P(X = 3) + P(X = 4) + P(X = 5)$

$= {}^5C_3 \left(\frac{1}{3}\right)^3 \left(\frac{2}{3}\right)^2 + {}^5C_4 \left(\frac{1}{3}\right)^4 \left(\frac{2}{3}\right)^1 + {}^5C_5 \left(\frac{1}{3}\right)^5$

$= \frac{10\times 4}{3^5} + \frac{5\times 2}{3^5} + \frac{1\times 1}{3^5}$

$= \frac{51}{3^5} = \frac{17}{81}$

2. (B) $\sin^{-1}\frac{7}{25} + \cos^{-1}\frac{3}{5}$

$\Rightarrow \tan^{-1}\frac{7}{24} + \tan^{-1}\frac{4}{3}$

$\Rightarrow \tan^{-1}\left[\frac{\frac{7}{24}+\frac{4}{3}}{1-\frac{7}{24}\times\frac{4}{3}}\right]$

$\Rightarrow \tan^{-1}\left[\frac{21+96}{72-28}\right] \Rightarrow \tan^{-1}\frac{117}{44}$

3. (C) $\begin{vmatrix} 2! & 3! & 4! \\ 5! & 6! & 7! \\ 8! & 9! & 10! \end{vmatrix}$

$\Rightarrow \begin{vmatrix} 2! & 3\times 2! & 4\times 3\times 2! \\ 5! & 6\times 5! & 7\times 6\times 5! \\ 8! & 9\times 8! & 10\times 9\times 8! \end{vmatrix}$

$\Rightarrow 2!\times 5!\times 8! \begin{vmatrix} 1 & 3 & 12 \\ 1 & 6 & 42 \\ 1 & 9 & 90 \end{vmatrix}$

$R_2 \to R_2 - R_1$ and $R_3 \to R_3 - R_1$

$\Rightarrow 2!\times 5!\times 8! \begin{vmatrix} 1 & 3 & 12 \\ 0 & 3 & 30 \\ 0 & 6 & 78 \end{vmatrix}$

$\Rightarrow 2!\times 5!\times 8! \times (3\times 78 - 6\times 30) - 0$

$\Rightarrow 2!\times 5!\times 8!\times (234 - 180)$

$\Rightarrow 54\times 2!\times 5!\times 8!$

4. (B) $y = \ln(e^{2x} + e^{-2x})$

On differentiating both side w.r.t 'x'

$\frac{dy}{dx} = \frac{1}{e^{2x}+e^{-2x}}(2e^{2x} - 2e^{-2x})$

$\frac{dy}{dx} = \frac{2\left(e^{2x} - e^{-2x}\right)}{e^{2x}+e^{-2x}}$

Again, differentiating

$\frac{d^2y}{dx^2} = 2 \times \frac{\left(e^{2x}+e^{-2x}\right)\left(2e^{2x}+2e^{-2x}\right) - \left(e^{2x}-e^{-2x}\right)\left(2e^{2x}-2e^{-2x}\right)}{\left(e^{2x}+e^{-2x}\right)^2}$

$\frac{d^2y}{dx^2} = 4 \times \frac{\left(e^{2x}+e^{-2x}\right)^2 - \left(e^{2x}-e^{-2x}\right)^2}{\left(e^{2x}+e^{-2x}\right)^2}$

$\frac{d^2y}{dx^2} = 4 \times \frac{\left(e^{4x}+2+e^{-4x}\right) - \left(e^{4x}-2+e^{-4x}\right)}{\left(e^{2x}+e^{-2x}\right)^2}$

$\frac{d^2y}{dx^2} = 4 \times \frac{2+2}{\left(e^{2x}+e^{-2x}\right)^2} = \frac{16}{\left(e^{2x}+e^{-2x}\right)^2}$

5. (C) $S = \sqrt{3} + 2\sqrt{3} + 4\sqrt{3} + ...n$ terms

$S = \frac{\sqrt{3}\left(2^n - 1\right)}{2-1}$

$S = \sqrt{3}\left(2^n - 1\right)$

6. (D) ${}^nC_r + {}^nC_{r+1}$

$\Rightarrow \frac{n!}{r!(n-r)!} + \frac{n!}{(r+1)!(n-r-1)!}$

$\Rightarrow \frac{n!}{r!(n-r)(n-r-1)!} + \frac{n!}{(r+1)r!(n-r-1)!}$

$$\Rightarrow \frac{n!}{r!(n-r-1)!}\left[\frac{1}{n-r}+\frac{1}{r+1}\right]$$

$$\Rightarrow \frac{n![r+1+n-r]}{r!(n-r-1)!(n-r)(r+1)}$$

$$\Rightarrow \frac{(n+1)n!}{(r+1)r!(n-r)(n-r-1)!}$$

$$\Rightarrow \frac{(n+1)!}{(r+1)!(n-r)!} = {}^{n+1}C_{r+1}$$

7. (C) A.T.Q.
$a + ar + ar^2 = 27$ ...(i)
and $ar^3 + ar^4 + ar^5 = 729$
$\Rightarrow r^3(a + ar + ar^2) = 729$
$\Rightarrow r^3 \times 27 = 729$
$\Rightarrow r^3 = 27 \Rightarrow r = 3$
from equ. (i)
$a + a \times 3 + a \times 9 = 27$

$$\Rightarrow 13a = 27 = a = \frac{27}{13}$$

Hence first term = $\frac{27}{13}$

8. (D) C.V. (Ist distribution) = 60, $\sigma_1 = 21$
C.V. (2nd distribution) = 80, $\sigma_2 = 16$
Let x_1 and x_2 be the means of Ist and 2nd distribution respectively, then

$$\text{C.V. (Ist distribution)} = \frac{\sigma_1}{x_1}\times 100$$

$$\Rightarrow 60 = \frac{21}{x_1}\times 100$$

$$\Rightarrow x_1 = \frac{21}{60}\times 100 \Rightarrow x_1 = 35$$

$$\text{and C.V. (2nd distribuation)} = \frac{\sigma_2}{x_2}\times 100$$

$$\Rightarrow 80 = \frac{16}{x_2}\times 100$$

$$\Rightarrow x_2 = \frac{16}{80}\times 100 \Rightarrow x_2 = 20$$

Hence means are 35 and 20.

9. (B) $\cos^2 x + \sin^2 y = 1$
On differentiating both side w.r.t. 'x'

$$\Rightarrow 2\cos x.(-\sin x) + 2\sin y.\cos y\frac{dy}{dx} = 0$$

$$\Rightarrow 2\sin y.\cos y\frac{dy}{dx} = 2\sin x.\cos x$$

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

10. (B) $\vec{a} = 3\hat{i} - 4\hat{j} + 5\hat{k}$ and $\vec{b} = 2\hat{i} + \hat{j} - 2\hat{k}$

$$\text{Projection of } \vec{a} \text{ on } \vec{b} = \left|\frac{\vec{a}.\vec{b}}{|\vec{b}|}\right|$$

$$= \left|\frac{3\times 2 - 4\times 1 + 5\times(-2)}{\sqrt{2^2+1^2+(-2)^2}}\right|$$

$$= \left|\frac{6-4-10)}{\sqrt{9}}\right| = \frac{8}{3}$$

11. (B) $4^{\frac{1}{2}} \times 4^{\frac{1}{4}} \times 4^{\frac{1}{8}} \times .....\infty$

$$\Rightarrow 4^{\left(\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+.....\infty\right)}$$

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

12. (B) $I = \int \log(x+2)\,dx$
Let $x + 2 = t \Rightarrow dx = dt$
$I = \int \log t\,dt$

$$I = \log t \int 1.\,dt - \int\left\{\frac{d}{dt}(\log t).\int 1dt\right\}dt$$

$$I = (\log t).t - \int \frac{1}{t}.t\,dt$$

$I = t\log t - t + c$
$I = (x + 2)\log(x + 2) - (x + 2) + c$
$I = (x + 2)\log(x + 2) - x + c$

13. (D) A' = cofactor of A
$|A'| = |\text{cofactor of A}|$
$|A'| = (A)^{5-1}$ [$\because$ order = 5]
$|A'| = A^4$

71. (A) Pork is the meat of pig while vanison is the meat of **Dear**.

72. (C) Flock is the group of ducks while **Pride** is the group of lions.

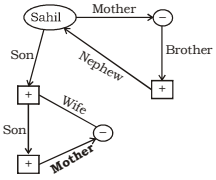
73. (A) **Andaman and Nicobar** is an island territory.

74. (A) Only '**729**' is the number whose square root and cube root can be found.

75. (A) $7 \times 4 + 1 = 29$
$29 \times 4 + 1 = 117$
$6 \times 4 + 2 = 26$
$26 \times 4 + 2 =$ **106**
$5 \times 4 + 3 = 23$
$23 \times 4 + 3 = 95$

76. (B) (8 × 5) + (6 + 3) = 49
(7 × 9) + (16 + 4) = 83
(11 × 7) + (14 + 8) = **99**

77. (A)



78. (B) 'Not only' will come after 'was'. Then the sentenced will be in correct order.
-------+not only +noun/adjective + but also + noun/adjective

85. (D) lovingly is an adverb, which can not quality appearance (noun). To qualify a noun an adjective is used and i.e. why lovingly should be replaced with loving.

HSSC MOCK TEST – 172 (ANSWER KEY)

1.	(B)	11.	(B)	21.	(A)	31.	(C)	41.	(B)	51.	(C)	61.	(C)	71.	(A)	81.	(C)
2.	(B)	12.	(B)	22.	(D)	32.	(B)	42.	(A)	52.	(C)	62.	(C)	72.	(C)	82.	(C)
3.	(C)	13.	(D)	23.	(B)	33.	(A)	43.	(C)	53.	(A)	63.	(D)	73.	(A)	83.	(A)
4.	(B)	14.	(D)	24.	(D)	34.	(D)	44.	(B)	54.	(D)	64.	(B)	74.	(A)	84.	(D)
5.	(C)	15.	(D)	25.	(D)	35.	(D)	45.	(C)	55.	(B)	65.	(C)	75.	(A)	85.	(C)
6.	(D)	16.	(D)	26.	(C)	36.	(A)	46.	(D)	56.	(A)	66.	(B)	76.	(B)	86.	(B)
7.	(C)	17.	(B)	27.	(A)	37.	(C)	47.	(B)	57.	(D)	67.	(A)	77.	(A)	87.	(C)
8.	(D)	18.	(B)	28.	(D)	38.	(B)	48.	(B)	58.	(D)	68.	(A)	78.	(B)	88.	(D)
9.	(B)	19.	(A)	29.	(B)	39.	(C)	49.	(D)	59.	(D)	69.	(A)	79.	(A)	89.	(C)
10.	(B)	20.	(B)	30.	(A)	40.	(A)	50.	(B)	60.	(B)	70.	(A)	80.	(A)	90.	(D)