ALLEN CAREER INSTITUTE KOTA (RAJASTHAN) path to success

DISTANCE LEARNING PROGRAMME
(Academic Session : 2018 - 2019)

LEADER TEST SERIES / JOINT PACKAGE COURSE
TARGET : JEE (Main + Advanced) 2019

Test Type : **ALL INDIA OPEN TEST** (MAJOR) Test Pattern : JEE-Advanced

TEST # 12 **TEST DATE : 28 - 04 - 2019**

PAPER-2

PART-1 : PHYSICS **ANSWER KEY**

	Q.	1	2	3	4	5	6	7	8	9	10
SECTION-I	A.	C	C	B	A	C	C	C	B,D	B,D	C,D
	Q.	11	12	13	14	15	16	17	18		
	A.	A,C	A,D	A,C	A,D	C	B	D	A		

SOLUTION

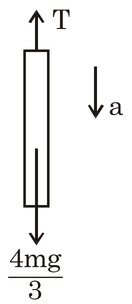
SECTION-I

1. Ans. (C)

2. Ans. (C)

Sol. $a = \dfrac{2m - m}{3m} g = \dfrac{g}{3}$

Now apply Newton's 2[nd] law on lower 2/3[rd] part of rod.



We get $\dfrac{4mg}{3} - T = \dfrac{4m}{3} a = \dfrac{4m}{3} \times \dfrac{g}{3}$

$T = \dfrac{4mg}{3} - \dfrac{4mg}{9}$

$T = \dfrac{8mg}{9}$

3. Ans. (B)

4. Ans. (A)

Sol. $R_{AB} = \int_0^{\ell} \dfrac{\rho_0}{A}\left(1 - \dfrac{x}{\ell}\right)dx = \dfrac{\rho_0}{2A}\ell$

$R_{BC} = \int_0^{\ell/3} \dfrac{\rho_0}{A}\left(1 - \dfrac{x}{\ell}\right)dx = \dfrac{5\rho_0\ell}{18A}$

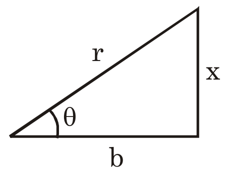
& $R_{AC} = \dfrac{\rho_0\ell}{2A} - \dfrac{5\rho_0\ell}{18A} = \dfrac{2}{9}\dfrac{\rho_0\ell}{A}$

at null point ; $\dfrac{X}{R} = \dfrac{R_{AC}}{R_{CB}} = \dfrac{2}{9} \times \dfrac{18}{5} = \dfrac{4}{5}$

$\therefore X = \dfrac{4R}{5}$

5. Ans. (C)

Sol.

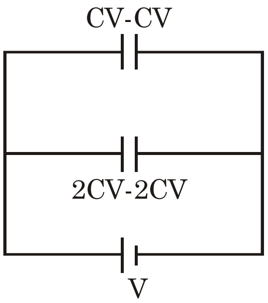


$x = b\tan\theta$

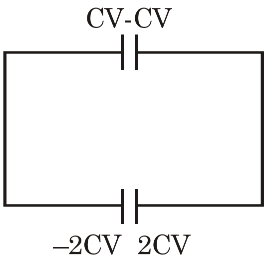
$v = \left(\dfrac{dx}{dt}\right) = b\sec^2\theta \left|\dfrac{d\theta}{dt}\right|$

6. Ans. (C)

Sol.



Now, polarity change



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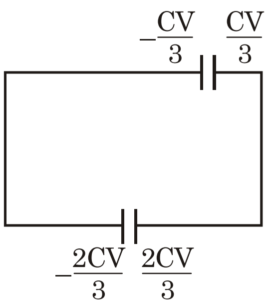


$$V_{common} = \frac{-CV + 2CV}{3C}$$

$$= \frac{V}{3}$$

Charge flow $\Rightarrow 2CV - \frac{2CV}{3} \Rightarrow \frac{4CV}{3}$

Energy loss

$$= \frac{1}{2}CV^2 + \frac{1}{2}2CV^2 - \frac{1}{2}C\left(\frac{V}{3}\right)^2 - \frac{1}{2}2C\left(\frac{V}{3}\right)^2$$

$$= \frac{4}{3}CV^2$$

7. Ans. (C)

Sol. $E_1 = E_4 = E_5 = 0$

$$E_2 = E_3 = \frac{\sigma}{2\varepsilon_0} + \frac{\sigma}{2\varepsilon_0} = \frac{\sigma}{\varepsilon_0}$$

8. Ans. (B, D)

Sol. $T_A > T$

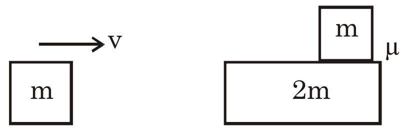
Loss by radiation > absorption by radiation

$T_B < T$

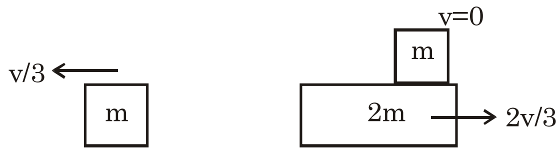
Loss by radiation < absorption by radiation

9. Ans. (B,D)

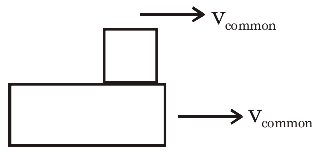
Sol.



After collision



After some time



$$v_{common} = \frac{2m\left(\frac{2v}{3}\right)}{3m}$$

$$\Rightarrow \frac{4v}{9}$$

$$w_f = K_f - K_i = \frac{4}{27}mv^2$$

10. Ans. (C, D)

Sol. $\vec{F} = q\left(\vec{v} \times \vec{B}\right)$ and $\vec{v} \parallel \vec{B}$ so, F = 0

11. Ans. (A,C)

Sol. 1-2 → Isobaric expansion

2-3 → Isothermal compression

3-4 → Isobaric compression

4-1 → Isothermal expansion

↓

Draw all graph accordingly

12. Ans. (A,D)

Sol. Electric field at P → towards left

Force experience by –q → towards right

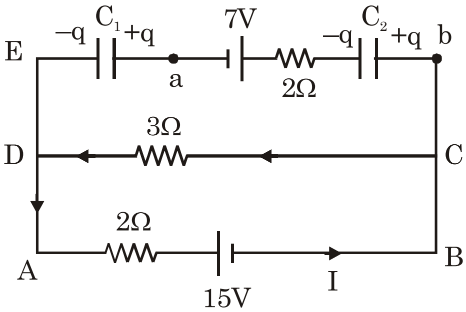
→ Potential energy will decreases

13. Ans. (A,C)

14. Ans. (A,D)

Sol. At steady state

I(3) + I(2) = 15



I = 3

Using KVL in loop CDEab

$$\frac{q}{11}+\frac{q}{5} = 7 + 3 \times 3 = 16$$

q = 55 μC

Thus

$$V_a - 7 + \frac{q}{5} = v_b$$

$$\Rightarrow\ V_a - V_b = 7 - \frac{q}{5} = 7 - \frac{55}{5} = \frac{55}{5} = -4V$$

p.d. across C_1

$$\frac{q}{11} = \frac{55}{11} = 5V$$

p.d. across C_2

$$\frac{q}{5} = 11V$$

p.d. across terminal = 15 – I(2) = 15 – 3 × 2 = 9V

15. Ans. (C)

Sol. $\vec{M} = -\frac{ge\vec{L}}{2m}$

$$\tau = \vec{M} \times \vec{B}$$

$$\vec{\omega}_P \times \vec{L} = \vec{M} \times \vec{B}$$

$$\Rightarrow \omega_P L = MB$$

$$\Rightarrow \omega_P L = \frac{geL}{2m} \cdot B$$

$$\Rightarrow \omega_P = \frac{geLB}{2mL} = \frac{geB}{2m}$$

16. Ans. (B)

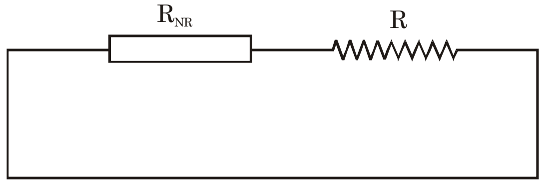
Sol. $\omega = \omega_P$

$$\frac{eB}{m} = \frac{geB}{2m}$$

$\Rightarrow$ g = 2

17. Ans. (D)

Sol.



By KVL

$$iR_0\left[\left(\frac{i}{i_0}\right)^2 - 1\right] + iR = 0$$

$$\Rightarrow \frac{R_0 i^2}{i_0^2} - R_0 + R = 0$$

$$\Rightarrow \frac{i^2}{i_0^2}[R_0] = R_0 - R$$

Since $R_0 > R$

$$i^2 = i_0^2\left[\frac{R_0 - R}{R_0}\right]$$

$$i = i_0\sqrt{\frac{R_0 - R}{R_0}}$$

18. Ans. (A)

Sol. $\frac{i^2}{i_0^2}[R_0] = R_0 - R$

when $R_0 < R$, $i \neq 0$, LHS & RHS are of different sign, which is not possible.

So, i = 0

$\Rightarrow$ V across R will be zero.

PART-2 : CHEMISTRY — ANSWER KEY

SECTION-I	Q.	1	2	3	4	5	6	7	8	9	10
	A.	D	A	D	A	C	B	A	A,D	B,C	A,C,D
	Q.	11	12	13	14	15	16	17	18		
	A.	A,C	A,B,C,D	A,B	A,B,D	C	D	D	C		

SOLUTION

SECTION-I

1. **Ans.(D)**

2. **Ans.(A)**

Sol. $\Delta U = 1 \times 20 \times 100 = 2000$ J/mol

$\Delta H = \Delta U + (50-10)\times 100 = 2000 + 4000$

$= 6000$ J/mol $= 6$ kJ/mole

3. **Ans.(D)**

Sol. Due to inert pair effect lower oxidation state in 15[th] group stabilizes down the group. Hence Bi^{3+} is more stable than Bi^{5+}. Sb^{5+} is more stable than Sb^{3+} hence Sb^{3+} is reducing agent.

4. **Ans.(A)**

Sol. Chlorides, Bromides & Iodides due to their large size have high covalent nature. However in fluorides, Lattice energy is more dominating factor. Hence follows a decreasing trend

LiF > NaF > KF > RbF > CsF

5. **Ans.(C)**

6. **Ans.(B)**

7. **Ans.(A)**

8. **Ans.(A,D)**

Sol. $d = \frac{M}{V_m} \Rightarrow 0.25 = \frac{2}{V_m}$

$\Rightarrow V_m = 8$ lit

$\frac{PV_m}{P(V_m - b)} = \frac{ZRT}{RT} \Rightarrow \frac{V_m}{V_m - b} = Z$

$Z = 1.06$

9. **Ans.(B,C)**

Sol. $k = c \times \frac{\ell}{A} = \frac{1}{200} \times \frac{4}{10} = 2 \times 10^{-3}\Omega^{-}cm^{-1}$

$\lambda_m = k \times \frac{1000}{M} = 2 \times 10^{-3} \times \frac{1000}{0.1} = 20\Omega^{-1}cm^2/mol$

$\alpha = \frac{\lambda_m}{\lambda_{m^\circ}} = \frac{20}{500} = 0.04$

$BOH \rightleftharpoons B^+ + OH^-$

0.1

$0.1(1-\alpha)$ $\quad 0.1\alpha \quad 0.1\alpha$

$k_b = 0.1\frac{\alpha^2}{1-\alpha} \simeq 0.1 \times 16 \times 10^{-4} = 1.6 \times 10^{-4}$

$[OH^-] = 0.1 \times 0.04 = 4 \times 10^{-3}$

pOH $= 3 - \log 4 \Rightarrow$ pH $= 14 - 3 + \log 4 = 11.6$

$\pi = iCRT = 1.04 \times 0.1 \times 0.08 \times 400$

$\pi = 3.328$ atm

10. **Ans.(A,C,D)**

Sol. Composition of FeS is always higher in matte as compared to blister copper (98.5% pure). If O_2 is used, copper cannot be obtained from its oxide.

In electrolysis of $CuSO_4$ (aq.), on passing H_2 direction of reaction

$2H^+_{(aq.)} + 2e^- \longrightarrow H_2(g)$ can be reversed which in turn will facilitate reduction of Cu in place of hydrogen.

Cu_2O can be reduced by coke.

Hence answer is A,C,D.

11. **Ans.(A,C)**

Sol. $Cl_2 + \underset{(dry)}{\text{Slaked lime}} \longrightarrow Ca(OCl)_2 + CaCl_2 + 2H_2O$

12. **Ans. (A,B,C,D)**

13. **Ans.(A,B)**

14. **Ans. (A,B,D)**

15. **Ans.(C)**

16. **Ans.(D)**

Sol. Ag^+ (0.05M) + X^- (0.02M) $\longrightarrow AgX_{(s)}$

$Q = \frac{1}{10^{-3}} = 10^3$

$E^0_{cell} = -0.06 \log Ksp$

$E_{cell} = -0.06 \log K_{sp} - 0.06 \log Q$

$= -0.06[\log K_{sp} + \log 10^3]$

$\frac{-E_{cell}}{0.06} - 3 = \log K_{sp}$

$\frac{-0.66}{0.06} - 3 = \log k_{sp} \Rightarrow \log k_{sp} = -14$

$k_{sp} = 10^{-14}$

17. **Ans.(D)**

Sol. Cu will be precipitated as Cu_2S (Black)

Cd will be precipitated as CdS (Yellow)

18. **Ans.(C)**

PART-3 : MATHEMATICS — ANSWER KEY

SECTION-I	Q.	1	2	3	4	5	6	7	8	9	10
	A.	C	B	D	D	C	C	B	A,B,C	A,D	A,C
	Q.	11	12	13	14	15	16	17	18		
	A.	A,B,C,D	A,D	A,B,D	A,B,D	D	A	A	C		

SOLUTION

SECTION-I

1. Ans. (C)

Sol. $P = \{a, a+1, a+2, ...a+m-1\}$

$\frac{m}{2}\{2a+m-1\} = 2m \Rightarrow 2a+m=5$ ...(i)

$Q = \{b, b+1, b+2, ...b+2m-1\}$

$\frac{2m}{2}\{2b+2m-1\} = m \Rightarrow b+m=1$ ...(ii)

$(b+2m-1)-(a+m-1) = 1009$

$b-a+m = 1009$ ...(iii)

$1-m-\frac{5}{2}+\frac{m}{2}+m = 1009$

$\frac{m}{2} = 1010.5 \Rightarrow m = 2021$

2. Ans. (B)

Sol. $P_1 : x+y+z+3=0$

$P_2 : x-y+z=2$

Let equation of plane be $P_1 + \lambda P_2 = 0$

$(x+y+z+3)+\lambda(x-y+z-2)=0$

(3,0,2) —2— (1,2,0) —1— (0,3,–1)

(1,2,0) satisfy the plane and $\lambda = 2$

$3x-y+3z=1$

3. Ans. (D)

Sol. $(2\text{cosec}x-1)^{1/3}+(\text{cosec}x-1)^{1/3}=1$

cube both sides

$(3\,\text{cosec}x-2)+3(2\,\text{cosec}x-1)^{1/3}(\text{cosec}x-1)^{1/3}$
$=1$

$(2\,\text{cosec}x-1)^{1/3}(\text{cosec}x-1)^{1/3}=(1-\text{cosec}x)$

$(2\text{cosec}x-1)^{1/3}=-(\text{cosec}x-1)^{2/3}$

$\Rightarrow \text{cosec}x = 0$ (neglect)

or

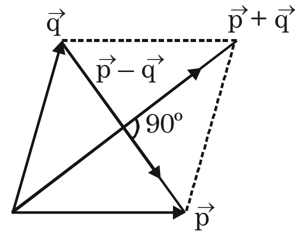
$\text{cosec}x = 1 \Rightarrow \sin x = 1,\ x = 2n\pi+\frac{\pi}{2}$

$\Rightarrow$ 1 solution in $(0,2\pi)$

$\Rightarrow$ k solutions in $(-k\pi, k\pi) \Rightarrow k = 16$

4. Ans. (D)

Sol. $\vec{p}+\vec{q}=\vec{r} \Rightarrow \vec{p}\wedge\vec{q}=120°$ and $\vec{r}$ is along angle bisector of $\vec{p}$ and $\vec{q}$



$\Rightarrow |p| = |q| \Rightarrow$ rhombus

$\Rightarrow \vec{p}+\vec{q}\perp\vec{p}-\vec{q}$

$\Rightarrow \vec{r}\perp\vec{p}-\vec{q}$

$|\vec{p}-\vec{q}|=\sqrt{3}\Rightarrow|\vec{p}-\vec{q}+\vec{r}|=2$

5. Ans. (C)

Sol. $f'(x)=\frac{1}{1+\sqrt{1-x^2}}\frac{(-2x)}{2\sqrt{1-x^2}}+\frac{2x}{2\sqrt{1-x^2}}-\frac{1}{x}$

$=\frac{-\sqrt{1-x^2}}{x}$

$y-\left(\ell n\left(1+\sqrt{1-h^2}\right)-\sqrt{1-h^2}-\ell nh\right)$

$=\frac{-\sqrt{1-h^2}}{h}(x-h)$

$B\left(0,\ell n\left(1+\sqrt{1-h^2}\right)-\ell nh\right)$

$A\left(h,\ell n\left(1+\sqrt{1-h^2}\right)-\sqrt{1-h^2}-\ell nh\right)$

$AB = d = 1$

6. Ans. (C)

Sol. $\frac{(4-4\cos2\theta)t^2+(1+\cos2\theta)-2t\sin2\theta}{(4-4\cos2\theta)t^2+(1+\cos2\theta)+2t\sin2\theta}$

$\frac{4.2\sin^2\theta t^2+2\cos^2\theta-4\sin\theta\cos\theta t}{4.2\sin^2\theta t^2+2\cos^2\theta+4\cos\theta\sin\theta t}$

$\frac{\frac{4\sin^2\theta t^2}{\cos^2\theta}-\frac{2\sin\theta}{\cos\theta}t+1}{\frac{4\sin^2\theta t^2}{\cos^2\theta}+\frac{2\sin\theta t}{\cos\theta}+1}$

put $2\tan\theta t = x$

$\frac{x^2-x+1}{x^2+x+1}$

it's range $\left[\frac{1}{3},3\right]$

7. Ans. (B)

Sol. For consistency $\begin{vmatrix} a & 1 & b \\ b & 1 & 2a \\ a & b & 3ab \end{vmatrix} = 0$

$a^2b - 3ab^2 + 2a^2 + b^3 - ab = 0$

$b^3 - 3ab^2 + (a^2 - a)b + 2a^2 = 0$

$b = 0 : a = 0$

$b = 1;\ 1 - 3a + a^2 - a + 2a^2 = 0$

$3a^2 - 4a + 1 = 0$

$(3a - 1)(a - 1) = 0 \Rightarrow a = 1$ (reject) or $a = \frac{1}{3}$

$b = 2 : 8 - 12a + 2a^2 - 2a + 2a^2 = 0$

$4a^2 - 14a + 8 = 0$

$2a^2 - 7a + 4 = 0$

$\Rightarrow$ not integral solution

only one ordered pair (0,0)

8. Ans. (A,B,C)

Sol. $f(x) = \frac{d}{dx}\left(\tan^{-1}\frac{x}{\sqrt{x^2+1}+1}\right)$

Let $x = \tan\theta \Rightarrow \theta \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

$\tan^{-1}\left(\frac{\tan\theta}{\sec\theta + 1}\right) = \tan^{-1}\left(\tan\frac{\theta}{2}\right)$

$\Rightarrow \frac{\theta}{2} = \frac{\tan^{-1}x}{2} \Rightarrow f(x) = \frac{1}{2(1+x^2)}$

$g(x) = \frac{1}{f(x)} + \frac{1}{f(x^2)} = 2(1 + x^2) + 2(1 + x^4)$

$= 2(x^4 + x^2 + 2)$

Range : $[4,\infty)$

Let $g^{-1}(x) = h(x) \Rightarrow h(g(x)) = x$

$h'(g(x)) = \frac{1}{g'(x)}$

put $x = 1$

$\left(g^{-1}\right)'(8) = \frac{1}{g'(1)} = \frac{1}{12}$

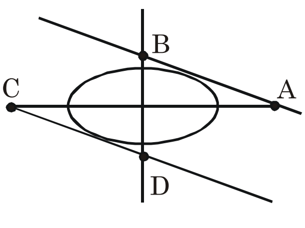
9. Ans. (A,D)

Sol. Equation of tangents $y = mx \pm \sqrt{a^2m^2 + b^2}$

$A\left(-\frac{\sqrt{a^2m^2+b^2}}{m}, 0\right)$

$B\left(0, \sqrt{a^2m^2+b^2}\right)$

$C\left(\frac{\sqrt{a^2m^2+b^2}}{m}, 0\right)$



$D\left(0, -\sqrt{a^2m^2+b^2}\right)$

OA.OC = OB.OD

$-\frac{a^2m^2+b^2}{m^2} = -\left(a^2m^2+b^2\right) \Rightarrow m^2 = 1$

$m = \pm 1$

10. Ans. (A,C)

Sol. Let

$P = \begin{bmatrix} a & b \\ c & d \end{bmatrix}; P\begin{bmatrix} 2 \\ -3 \end{bmatrix} = \begin{bmatrix} -11 \\ 6 \end{bmatrix} \Rightarrow \begin{matrix} 2a - 3b = -11 \\ 2c - 3d = 6 \end{matrix}$

also $P\begin{bmatrix} -11 \\ -6 \end{bmatrix} = \begin{bmatrix} -7 \\ -12 \end{bmatrix} \Rightarrow \begin{matrix} -11a - 6b = -7 \\ -11c - 6d = -12 \end{matrix}$

$\Rightarrow a = -1, b = 3, c = 0, d = 2$

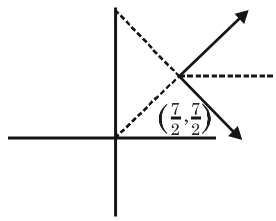
11. Ans. (A,B,C,D)

Sol. X denotes the event that Z lies on $\perp$ bisector of (0 + 0i) and (7 + 7i) $\Rightarrow \alpha + \beta = 7$

X = {(1,6), (2,5), (3,4),(4,3),(5,2),(6,1)}

$P(X) = \frac{1}{6}$

Y denotes the event that Z lies on a pair of rays starting from $\frac{7}{2}(1+i)$ at an angle of $\frac{\pi}{4}$ or $-\frac{\pi}{4}$



Y = {(4,4),(5,5),(6,6), (4,3),(5,2),(6,1)}

$P(Y) = \frac{1}{6}; P(X \cap Y) = \frac{3}{36} \Rightarrow P\left(\frac{X}{Y}\right) = P\left(\frac{Y}{X}\right) = \frac{1}{2}$

12. Ans. (A,D)

Sol. (A) ${}^{40}C_{10}.{}^{30}C_{10}.{}^{20}C_{10}.{}^{10}C_{10}$

(D) ${}^{40}C_{20}.20!\underbrace{(2!.2!....2!)}_{10\text{times}}$

13. Ans. (A,B,D)

$2019 = 3^1 \times 673^1$

Number of divisors = 2.2 = 4

$\sum_{k=1}^{n} d_k = (3^0 + 3^1)(673^0 + 673) = 4.674 = 2696$

$I = \int_{-3}^{3} x\ell n\left(d_1^x + d_2^x + d_3^x + d_4^7\right)dx$

$I = \int_{-3}^{3} x\ell n\left(\frac{2019^x}{2019^x}\left(d_1^x + d_2^x + d_3^x + d_4^x\right)\right)dx$

$$I=\int_{-3}^{3} x\ell n\left(2019^{x}\left(\left(\frac{d_1}{2019}\right)^{x}+\left(\frac{d_2}{2019}\right)^{x}+\left(\frac{d_3}{2019}\right)^{x}+\left(\frac{d_4}{2019}\right)^{x}\right)\right)dx$$

$$I=\int_{-3}^{3} x^2\ell n2019+x\ell n\left(d_4^{-x}+d_3^{-x}+d_2^{-x}+d_1^{-x}\right)dx$$

$$I=\int_{-3}^{3} x^2\ell n2019dx+\int_{-3}^{3} x\ell n\left(d_1^{-x}+d_2^{-x}+d_3^{-x}+d_4^{-x}\right)dx$$

(apply King)

$$I=\int_{-3}^{3} x^2\ell n2019dx+(-I)$$

$$2I=\int_{-3}^{3} x^2\ell n2019dx$$

$$I=\int_{0}^{3} x^2\ell n2019dx=\frac{x^3}{3}\ell n2019\Big|_0^3=9\ell n2019$$

14. Ans. (A,B,D)

$$f(x)=\ell n^2x-\frac{1}{6}\Rightarrow f(e)=\frac{5}{6}$$

$$f'(x)=\frac{2\ell nx}{x}\ge 0\ \forall x\in[1,\infty)$$

$f(x)$ is strictly increasing function

$$f(1)=-\frac{1}{6}<0$$

$$f''(x)=2\left[\frac{1-\ell nx}{x^2}\right]$$

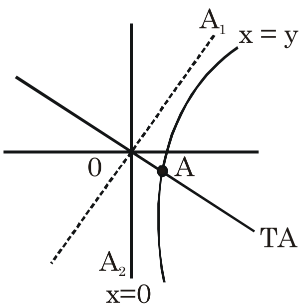
Equation of tangent :

$$y-\frac{5}{6}=\frac{2}{e}(x-e)\Rightarrow y=\frac{2x}{e}-\frac{7}{6}$$

$$\text{Area}=\int_{1}^{e}\left[\left(\ell n^2x-\frac{1}{6}\right)-\left(\frac{2x}{e}-\frac{7}{6}\right)\right]dx=e+\frac{1}{e}-3$$

Paragraph for Question 15 to 16

Sol.



$y=x-\dfrac{1}{x}$ is a hyperbola having asymptotes

$x^2-xy=0\Rightarrow x=0$ and $x=y$

equaiton of TA : $y=\tan\left(-\dfrac{\pi}{8}\right)x$

$$y=\left(1-\sqrt{2}\right)x$$

point A is intersection point of TA and H

$$\left(1-\sqrt{2}\right)x=x-\frac{1}{x}\Rightarrow x=\frac{1}{2^{1/4}}$$

$$\Rightarrow A\left(\frac{1}{2^{1/4}},\frac{1-\sqrt{2}}{2^{1/4}}\right)$$

$$OA=\sqrt{\frac{1}{\sqrt{2}}+\frac{3-2\sqrt{2}}{\sqrt{2}}}=\sqrt{2\sqrt{2}-2}$$

Angle between asympototes

$$\Rightarrow 2\tan^{-1}\frac{b}{a}=\frac{3\pi}{4}$$

$$\frac{b}{a}=\left(\sqrt{2}+1\right)\Rightarrow\frac{b^2}{a^2}=3+2\sqrt{2}=e^2-1$$

$$e=\sqrt{4+2\sqrt{2}}$$

15. Ans. (D)

16. Ans. (A)

17. Ans. (A)

Sol. The number of sides in C_0 is 5. Now each side

produce 11 sides

hence number of sides in C_1 = 5.11

number of sides in C_2 = 5.11^2

⋮ ⋮ ⋮

number of sides in C_n = 5.11^n

$$C_{11}=5.11^{11}=\frac{(11-1)11^{11}}{2}=\frac{11^{12}-11^{11}}{2}$$

18. Ans. (C)

Sol. Side length of C_0 is 1

Side length of C_1 is $\dfrac{1}{5}$

Side length of C_2 is $\dfrac{1}{5^2}$

⋮

Hence P_0 = 5

$$P_1=5.11.\frac{1}{5}$$

$$P_2=5.11^2.\frac{1}{5^2}$$

⋮

$$P_n=5.11^n.\frac{1}{5^n}=\frac{11^n}{5^{n-1}}\quad\Rightarrow\quad P_n=\left(\frac{11}{5}\right)^n.5$$

$$\lim_{n\to\infty}\sum_{k=0}^{n}\frac{1}{P_k}=\lim_{n\to\infty}\sum_{k=0}^{n}\left(\frac{5}{11}\right)^n.\frac{1}{5}=\frac{1}{5}.\frac{1}{1-\frac{5}{11}}=\frac{11}{30}$$