Test Pattern

JEE (Main)
MINOR
27-10-2024

ONLINE TEST SERIES
CONTACT PROGRAMME
(Academic Session : 2024 - 2025)

JEE(Main) : ENTHUSE + LEADER
ANSWER KEY

PART1 : PHYSICS

SECTION-A	Q.	1	2	3	4	5	6	7	8	9	10
	A.	B	A	D	C	D	C	D	D	B	B
	Q.	11	12	13	14	15	16	17	18	19	20
	A.	B	B	D	A	B	D	B	A	A	C
SECTION-B	Q.	1	2	3	4	5					
	A.	1	30	15	3	5					

PART 2 : CHEMISTRY

SECTION-A	Q.	1	2	3	4	5	6	7	8	9	10
	A.	B	B	C	C	A	B	D	A	B	A
	Q.	11	12	13	14	15	16	17	18	19	20
	A.	B	D	C	B	B	D	D	D	C	A
SECTION-B	Q.	1	2	3	4	5					
	A.	1	8	1	3	5					

PART 3 : MATHEMATICS

SECTION-A	Q.	1	2	3	4	5	6	7	8	9	10
	A.	B	B	C	A	D	A	C	C	A	B
	Q.	11	12	13	14	15	16	17	18	19	20
	A.	A	B	D	D	B	D	B	D	B	C
SECTION-B	Q.	1	2	3	4	5					
	A.	1	2	6	0	2					

HINT – SHEET

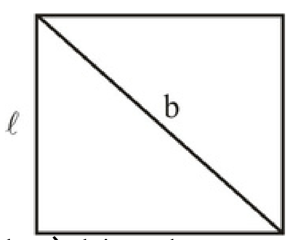
PART 1 : PHYSICS

SECTION-A

1. Ans (B)

$m_1 g\ell = \left(\frac{m_2 2\ell}{3}\omega\right) + m_1(L\omega)L$

2. Ans (A)



b → daigonal

$(b = \ell\sqrt{2})$

3. Ans (D)

Apply WET between initial and final position :

$\frac{1}{2}(I_1\omega^2 + I_2\omega^2 + I_3\omega^2) = mg\left(\frac{\ell}{3} + \frac{2\ell}{3} + \frac{3\ell}{3}\right)$

$\frac{1}{2}\left(\frac{m\ell^2}{9}\omega^2 + \frac{4m\ell^2}{9}\omega^2 + m\ell^2\omega^2\right) = mg(2\ell)$

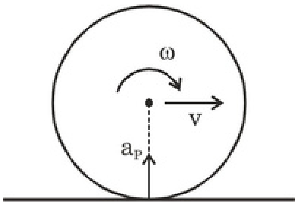
$\frac{14}{9}m\ell^2\omega^2 = mg4\ell$

$\frac{7}{18}\omega^2\ell = g$

$\omega = \sqrt{\frac{18g}{7\ell}}$

$V_B = \omega\frac{2\ell}{3} = \sqrt{\frac{8g\ell}{7}}$

4. Ans (C)



$a_P = \omega^2 R = \frac{v^2}{R}$

5. Ans (D)

T1 + T2 = mg (Force balance)

Torque about one end of rod

$T_2 \ell \cos 30° - mg \frac{\ell}{2} \cos 30° = 0$

So $T_1 = T_2 = \frac{mg}{2}$

6. Ans (C)

Velocity decreases so the angular momentum.

7. Ans (D)

$mv_0 \frac{\ell}{4} = \frac{m\ell^2}{3}\omega$

$\omega = \frac{3mv_0}{4\ell}$

$I = \frac{m\omega\ell}{2} - mv_0$

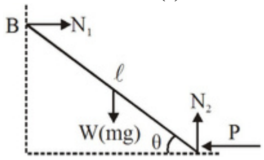
$= \frac{3mv_0}{8} - mv_0 = -\frac{5mv_0}{8}$

8. Ans (D)

The F.B.D. of rod is as shown.

for rod to be in translational equilibrium

N1 = P ....(i)



$N_2 = W = mg$ ...(ii)

For rod to be in rotational equilibrium, net torque on rod about any axis is zero.

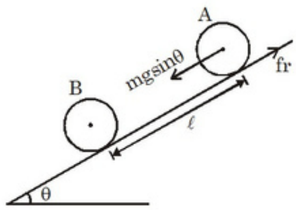
∴ Net torque on rod about B is zero i.e.,

$mg\frac{\ell}{2}\cos\theta - N_2\ell\cos\theta + P\ell\sin\theta = 0$...(iii)

From equation (ii) and (iii) solving we get

$P = \frac{mg}{2}\cot\theta$

9. Ans (B)



WET from A to B

$\omega_{mg} + \omega_{fr} = \Delta KE.$

$mg \sin\theta \times \ell + w_{fr} = k$

$\omega_{fr} = k - mg\sin\theta\ell$

10. Ans (B)

$\alpha = \frac{FL/2}{\frac{ML^2}{12}} = \frac{6F}{ML}$

$\vec{a}_p = \vec{a}_{cm} + \vec{a}_{p,cm}$

$\therefore a_p = \frac{F}{M} + \frac{L}{2} \times \frac{6F}{ML} = \frac{F}{M} + \frac{3F}{M} = \frac{4F}{M}$

11. Ans (B)

Given, slit width = a

Wavelength, $\lambda = 6500 \mathring{A}$

First minimum, $\theta = 30°$

For first diffraction minima,

$n\lambda = a\sin\theta$

$1 \times 6500 = a \sin 30°$

$a = 13000\mathring{A} = 1.3$ micron

12. Ans (B)

The resultant intensity is $I_R = 4I_0\cos^2\frac{\phi}{2}$

and $\phi = \left(\frac{2\pi}{\lambda}\right) \times \Delta x = \frac{2\pi}{\lambda}\left[\frac{xd}{D}\right]$

$\therefore I_R = 4I_0\cos^2\frac{(\pi xd)}{\lambda D}$

13. Ans (D)

$\beta = \frac{D\lambda}{d}$: only fringe width changes

* CBF remains at the same position if liquid is filled.

* If path diff at *O* increases, then CBF will shift upward.

14. Ans (A)

$\Delta\Phi = \frac{2\pi}{\lambda}(\Delta x_0)$

Optical path diff. $\Delta x_0 = \mu x$

15. Ans (B)

White spot on screen would be central maxima where

$Dx = 0$

$y = \frac{d}{2} - \frac{d}{6} = \frac{d}{3}$

16. Ans (D)

$RP. = \frac{\alpha}{1.22\lambda}$

$= \frac{6 \times 10^{-2}}{1.22 \times 540 \times 10^{-9}} = 9.1 \times 10^4$

17. Ans (B)

$I = \frac{1}{2} \epsilon_0 c E_0^2$

$E_0 = \sqrt{\frac{2I}{\epsilon_0 c}}$ or $\sqrt{\frac{2 \times 500 \times 10^9 \times 36\pi}{\pi \times 3 \times 10^8}}$

$E = 2\sqrt{3} \times 10^2$ N/C

18. (A) Ans

Wave is propagating in −ve x–direction.

$\hat{K} \times \hat{B} = -\hat{i}$ $\therefore \hat{E} \times \hat{B} = \hat{V}$

So $\hat{B} = \hat{j}$

$B_0 = \frac{E_0}{C} = \frac{1.5 \times 10^6}{3 \times 10^8} = 5 \times 10^{-3}$ T

$B = (B_0\hat{j})\sin[\omega t + kx + \phi]$

Or

$\vec{B} = (B_0\hat{j})\cos[\omega t + kx + \phi]$

$\vec{B} = (5 \times 10^{-3}\hat{j})\cos(\omega t + kx)$

19. Ans (A)

Speed of wave $= \frac{2 \times 10^{10}}{200} = 10^8$ m/s

Refractive index $= \frac{3 \times 10^8}{10^8} = 3$

Now refractive index $= \sqrt{\varepsilon_r \mu_r}$

$3 = \sqrt{\varepsilon_r(1)}$

$\Rightarrow \varepsilon_r = 9$

20. Ans (C)

$i_c = i_d$ (always)

PART 1 : PHYSICS

SECTION-B

1. Ans (1)

$\Delta x = (\mu_{rel} - 1)t = \left[\frac{\mu_2}{\mu_1} - 1\right]t$

$\mu_1 = \frac{4}{3}$

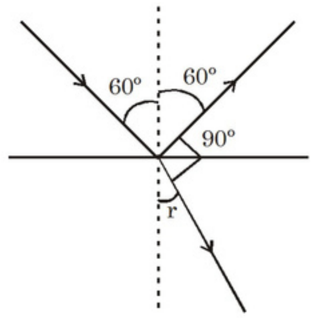
$\mu_2 = \frac{3}{2}$

$t = 8\ \mu m$

$\Delta x = 1\mu m$

(30)

2. Ans



At polarizing angle (Brewster's angle) angle between reflected and refracted ray is 90°

3. Ans (15)

$2\mu t \cos r = n\lambda$

$2 \times \frac{4}{3} \times t \cos 60 = 1 \times 5 \times 10^{-7}$

$t = 3.75 \times 10^{-7}$ m

4. Ans (3)

$a_1 = R\alpha - a_2 \Rightarrow 2 = 2\alpha - 4 \Rightarrow \alpha = 3$

2 m/s^2

5. Ans (5)

$mg - T = ma$ ....(i)

$T.R = \frac{mR^2}{2}.\alpha$ .... (ii)

$a = R\alpha$ ....(iii)

$\therefore T = \frac{mg}{3}$

PART 2 : CHEMISTRY

SECTION-A

1. Ans (B)

For reversible process at equilibrium $\Delta S = \frac{q_{rev}}{T}$

2. Ans (B)

$\eta = \frac{T_2 - T_1}{T_2}$

$\eta = \frac{500-300}{500} = \frac{2}{5}$

$\eta = \frac{W_{by}}{q_{source}}$ $\Rightarrow$ W_{by} = (nC) (q_{source}) = ($\frac{2}{5}$)(2 kcal) = 0.8 kcal

3. Ans (C)

$C_3H_6 + \frac{9}{2}O_2 \longrightarrow 3CO_2 + 3H_2O$

$3C + 3H_2 \longrightarrow C_3H_6$ ΔH = 20.6 kJ/mole

$C + O_2 \longrightarrow CO_2$ ΔH = –394 kJ/mole

$H_2 + \frac{1}{2}O_2 \longrightarrow H_2O$ ΔH = –285.8 kJ/mole

$(\Delta H_C)_{C_3H_6} = [3\Delta H_{CO_2} + 3\Delta H_f(H_2O) - \Delta H_f(C_3H_6)]$

= [3 × (–394) – 3(285.8) – 20.6]

$(\Delta H_C)_{C_3H_6} = -2060$ kJ/mole

4. Ans (C)

Closed container not insulated $\Rightarrow$ can exchange energy but not matter.

5. Ans (A)

$-w = \int PdV = \int \frac{10}{V} dV = 10 \ln \frac{V_2}{V_1} = 10 \times \ln 10$ atm L = 23 atm L = 2332.2 J

$(q = \Delta U - w)$

q = 420 + 2332.2 = 2752.2 J

6. Ans (B)

At constant pressure

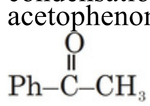
$\Delta H = nC_p\Delta T$

$\Delta U = nC_v\Delta T$

Required function = $\frac{-\Delta w}{\Delta H} = 1 - \frac{\Delta U}{\Delta H} = 1 - \frac{C_V}{C_P} = 1 - \frac{1}{\gamma}$

7. Ans (D)

Carbonyl compound having αH can give aldol condensation reaction. Only acetophenone



having α-hydrogen.

8. Ans (A)

For Assertion :Acetal and ketals are basically ethers hence they must be stable in basic medium but should break down in acidic medium.

Hence assertion is correct.

For reason: Alkoxide ion ($RO^{\ominus}$) is not must be false

(B)

9. Ans

More reactive carbonyl compound will oxidized & cross reaction carbonyl reduce.

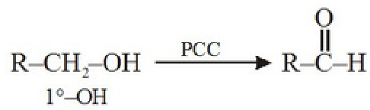
So, nitro benzaldehyde oxidized & p–methoxy benzaldehyde reduced.

10. Ans (A)

Acetaldehyde gives Iodoform, Fehling, Tollens, Benedict test

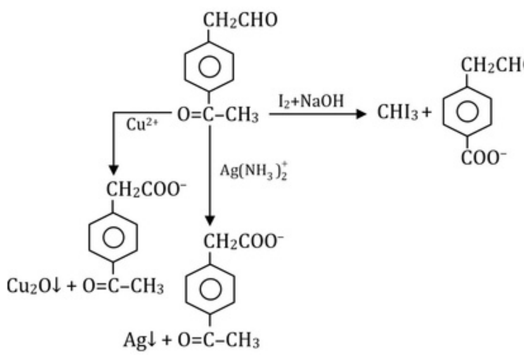
Acetone gives Iodoform test NOT Fehling, Tollens, Benedict test

11. Ans (B)



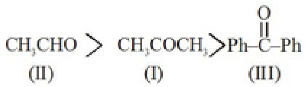
12. Ans (D)

Aldehydes give positive Tollens' and Fehling's test.

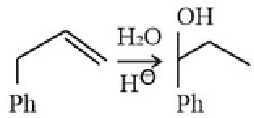


13. Ans (C)

Order of reactivity :



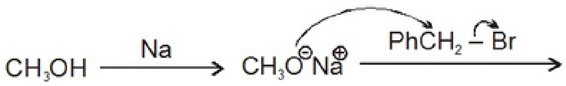
14. Ans (B)



15. Ans (B)

P.C.C. (Pyridinium chloro chromate) is mild-oxidising agent.

16. Ans (D)



$CH_3OCH_2Ph + NaBr$

Similarly for $PhCH_2OH \xrightarrow{Na}$

17. Ans (D)

We need inversion of configuration

Br2 / CCl4 gives no reaction

SOBr2 gives retention

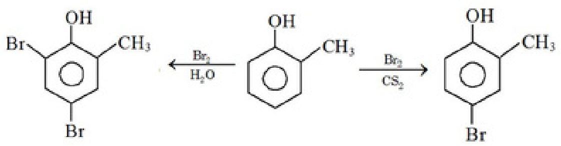
HBr / ZnBr2 will give racemisation.

TsCl / Pyridine followed by nucleophilic attack by Br^- will given inversion

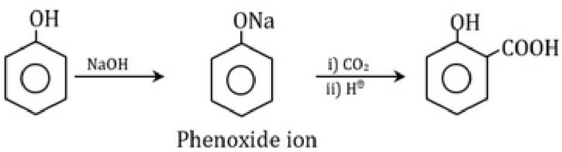
18. Ans (D)

Example of pinacol-pinacolone rearrangement.

19. Ans (C)



20. Ans (A)



In Kolbe's reaction phenoxide ion is treated with carbon dioxide.

PART 2 : CHEMISTRY

SECTION-B

1. Ans (1)

$\Delta G\circ = \Delta H\circ - T\Delta S\circ$

$=30000-3000\times10=0$

$\Delta G\circ = 0$

$-2.303\ RT \log Keq = 0$

Keq = 1

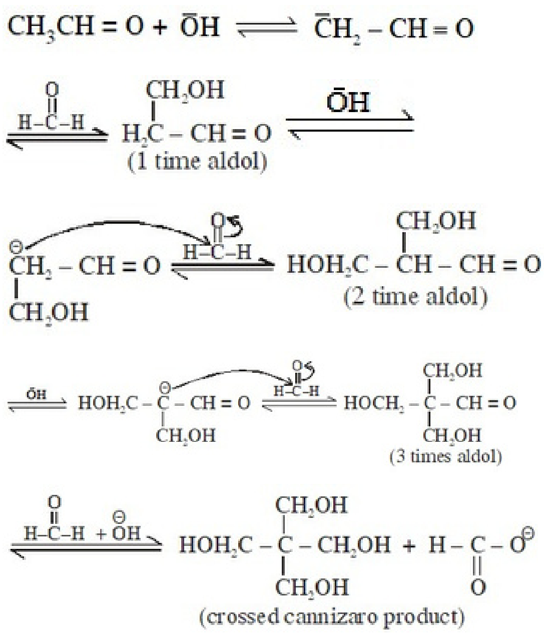
2. Ans (8)

$\Delta G^o = \Delta H^o - T\Delta S^o$

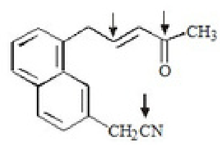
$21.6 = \Delta H_{H-H} - 300\ (2 \times S^oH - S^oH2)$

$\Delta H_{H-H} = 33.6 KJmole^{-1} = 8\ Kcalmole^{-1}$

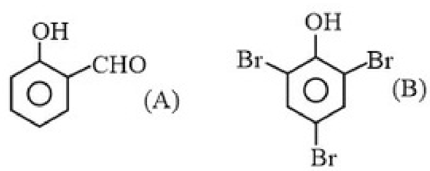
3. Ans (1)



4. Ans (3)



5. Ans (5)



x = 2

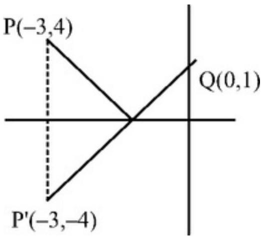
y = 3

x + y = 5

PART 3 : MATHEMATICS

SECTION-A

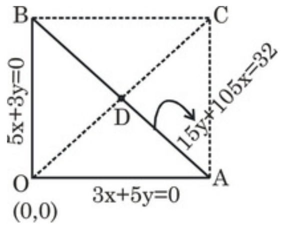
1. Ans (B)



Equation of line PQ : 5x – 3y + 3 = 0

put y = 0, $x = -\frac{3}{5}$

2. Ans (B)



On solving 3x + 5y = 0 and 15y + 105x = 32

We will get vertex A

(3x + 5y = 0) × 3

15y + 105x = 32

from equations

96x = 32 ⇒ $x = \frac{1}{3}$

$A \equiv \left(\frac{1}{3}, -\frac{1}{5}\right)$

Similarly $B \equiv \left(-\frac{2}{5}, \frac{2}{3}\right)$

$D = \left(\frac{\frac{1}{3} - \frac{2}{5}}{2}, \frac{-\frac{1}{5} + \frac{2}{3}}{2}\right) \equiv \left(-\frac{1}{30}, \frac{7}{30}\right)$ ... printed as $\left(\frac{11}{30}, \frac{-13}{30}\right)$

⇒ Equation of OD

⇒ $y = \frac{-13}{11}x$ ⇒ $\boxed{11y + 13x = 0}$

3. Ans (C)

Parametric equation of line through A(–1, 3)

is $\frac{x+1}{\cos\theta} = \frac{y-3}{\sin\theta} = r$

⇒ Any point on the line is

∴ B(ABcosθ – 1, ABsinθ + 3)
& C(ACcosθ – 1, ACsinθ + 3) lies

on x + y = 4 & y = x respectively.

⇒ ABcosθ – 1 + ABsinθ + 3 = 4

& ACcosθ – 1 = ACsinθ + 3

⇒ AC(cosθ – sinθ) = 4 ....(2)

But AB.AC = 16

∴ (1) × (2) ⇒ 16(cos2θ – sin2θ) = 8

or cos2θ = 1/2

given $\tan\theta = \pm\frac{1}{\sqrt{3}}$

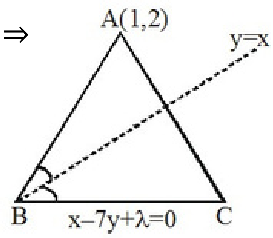
$\left(\frac{m1 - m2}{1 + m1m2}\right)^2 = \left(\frac{\frac{1}{\sqrt{3}} + \frac{1}{\sqrt{3}}}{1 - \frac{1}{3}}\right)^2 = 3$

4. Ans (A)

Image of A(1,2) in y = x lies on x – 7y + λ = 0

⇒ (2,1) satisfies BC

⇒ 2 – 7 + λ = 0 ⇒ λ = 5



5. Ans (D)

Image of A in y = x lies on BC = A1 (3, 1)

Image of A in y = -2x lies on BC = A_{11} (–3, 1)

Equation BC, y = 1

Ex centre opposite to A → I1 (0, 0)

AD → equation y = 3x

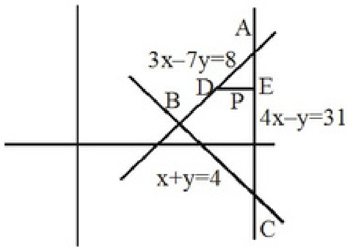
⇒ $D = \left(\frac{1}{3}, 1\right)$

$\frac{AI}{I1} = \frac{1}{2} \Rightarrow \frac{AI}{ID} = \frac{3}{1}$

∴ $I = \left(1, \frac{3}{2}\right)$

D

6. Ans (A)



Equation of DE is y = 2

so, point of intersection

D $\left(\frac{22}{3}, 2\right)$ and E $\left(\frac{33}{4}, 2\right)$

$\frac{22}{3} < \lambda < \frac{33}{4}$

7. Ans (C)

x – 3y = q ... (1)

ax + 2y = q ... (2)

ax + y = r ... (3)

it means equation (1) & (3) are perpendicular

$m_1 = \frac{1}{3}, m_3 = -a$

$m_1 \times m_3 = -1$

a = 3

It satisfied $a^2 - 9a + 18 = 0$

8. Ans (C)

Homogenize $x^2 + y^2 - 4x - 2y + 1 = 0$ with line

$x + \alpha y = 1$ gives

$x^2 + y^2 - 4x(x + \alpha y) - 2y(x + \alpha y) + (x + \alpha y)^2 = 0$

For angle to be 90°, we need coeff of x^2 + coeff of $y^2 = 0$

$(1 - 4 + 1) + (1 - 2\alpha + \alpha^2) = 0$

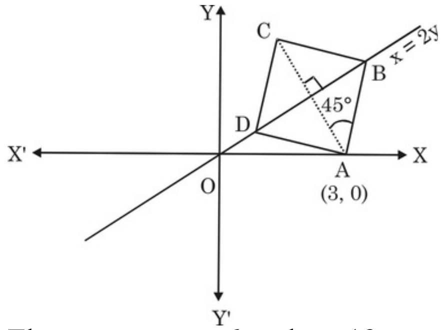
$\Rightarrow \alpha^2 - 2\alpha - 1 = 0$

9. Ans (A)

Equation of diagonal AC is

y−0=−2(x−3)

⇒2x+y=6



Then, we get $y = \frac{6}{5}$ and $x = \frac{12}{5}$

∴ Centre of square is $\left(\frac{12}{5}, \frac{6}{5}\right)$

Let slope of side AB or AD is m then, $\left|\frac{m-(-2)}{1+m(-2)}\right| = 1$

$m = -\frac{1}{3}$ m = 3

AB: y−0=3(x−3)

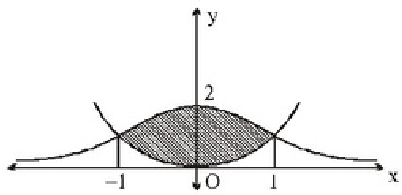
AD: $y - 0 = -\frac{1}{3}(x-3)$

10. Ans (B)

$$\text{Required area} = \int_{-1}^{1}\left(\frac{2}{1+x^2} - x^2\right)dx$$

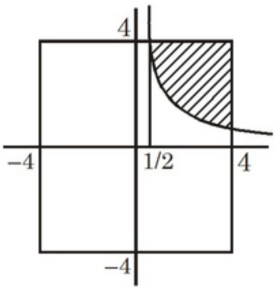
$$= 2\int_{0}^{1}\left(\frac{2}{1+x^2} - x^2\right)dx$$

$$= 2\left(2\tan^{-1}x - \frac{x^3}{3}\right)_0^1 = 2\left(\frac{\pi}{2} - \frac{1}{3}\right) = \pi - \frac{2}{3})$$



$\therefore \left[\pi - \frac{2}{3}\right] = 2$

11. Ans (A)



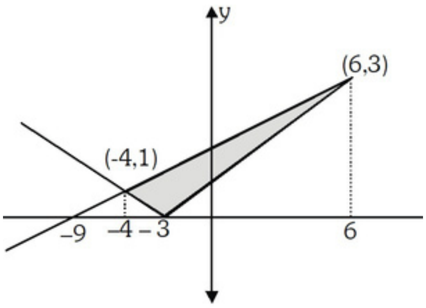
$|x| \le 4$ and $|y| \le 4$

Area of shaded portion

$\Delta = \int_{1/2}^{4} \frac{2}{x}dx \Rightarrow [2\ell nx]_{1/2}^{4} \Rightarrow 2[\ell n4+\ell n2]=\ell n64$

Shaded region = 14 − λn64

12. Ans (B)



Required Area

$\frac{1}{2}\times10\times4-\left[\int_{-4}^{-3}\sqrt{-x-3}\,dx+\int_{-3}^{6}\sqrt{x+3}\,dx\right]$

$20-\left[\frac{2}{3}[(-x-3)^{3/2}]_{-4}^{-3}+\frac{2}{3}[(x+3)^{3/2}]_{-3}^{6}\right]$

$20-\left[\frac{2}{3}[0-1]+\frac{2}{3}[9^{3/2}]\right]$

$20-\left[-\frac{2}{3}+\frac{2}{3}\times 33\right]$

$20-\left[-\frac{2}{3}+18\right]$

$=2-\frac{2}{3}=\frac{4}{3}$

13. Ans (D)

$y^2 = 4x$; $x^2 = 4y$

x = 4; y = 4

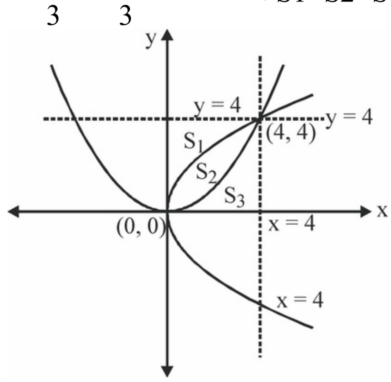
x = 0; y = 0

$S_3 = \int_0^4 \frac{x^2}{4}dx = \frac{x^3}{3.4} = \frac{64}{3.4} = \frac{16}{3}$

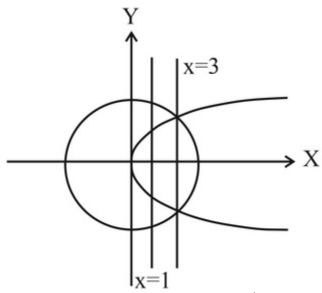
$S_1 = \int_0^4 \frac{y^2}{4}dy = \frac{y^3}{12} = \frac{64}{12} = \frac{16}{3}$

$S_2=\int_0^4 \left[2\sqrt{x}-\frac{x^2}{4}\right]dx=\left[2\cdot\frac{2x^{3/2}}{3}-\frac{x^3}{12}\right]_0^4$

$= \frac{32}{3} - \frac{16}{3} = \frac{16}{3} \Rightarrow S_1=S_2=S_3$



14. Ans (D)



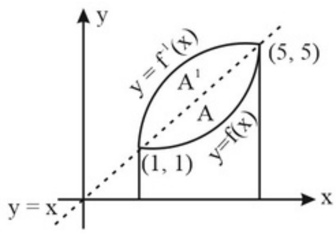
area $2\int_1^3 2\sqrt{x}dx + 2\int_3^{\sqrt{21}} \sqrt{21-x^2}dx$

$\Delta = \frac{8}{3}(3\sqrt{3}-1) + 21\sin^{-1}\frac{(2)-6\sqrt{3}}{\sqrt{7}}$ −

$\frac{1}{2}\left(\Delta-21\sin^{-1}\left(\frac{2}{\sqrt{7}}\right)\right) = \frac{2\sqrt{3}-\frac{8}{3}}{2}$

$= \sqrt{3}-\frac{4}{3}$

15. Ans (B)



A = $\frac{(4+1.4.4)}{}$ − 8

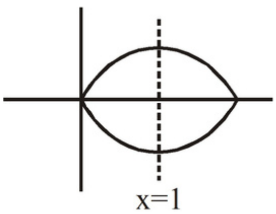
= 4 = A1

Required area =8+A+A1

= 8 + 8 = 16

16. Ans (D)

$y = x\sqrt{2-x}$



x=1

$2\int_0^1 x(\sqrt{2-x})dx$ Let 2 – x = t2

dx = –2

$2\int_{\sqrt{2}}^{1} (2-t2)t(-2t)dt$

$= 4\int_{1}^{\sqrt{2}} (2t2 - t4)dt$

$4\left(\frac{2t^3}{3} - \frac{t^5}{5}\right)_1^{\sqrt{2}}$

$4\left(\frac{42-42}{\sqrt{3}} \frac{1}{\sqrt{5}}\right) - \left(\frac{2}{3} - \frac{1}{5}\right)$

$4\frac{(82\sqrt{7})}{15} \frac{}{15}$

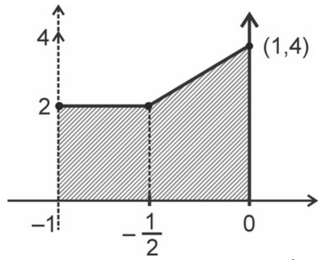
$\frac{4(8\sqrt{2}-7)}{15}$

17. Ans (B)

f(x) = |2{x} − 1| + |2{x} + 1|

|2{x} − 1| + 2{x} + 1

$= \begin{cases} 2 & 0 \leqslant \{x\} < \frac{1}{2} \\ 4\{x\} & \frac{1}{2} \leqslant \{x\} < 1 \end{cases}$



Required Area = $2\times \frac{1}{2} + \frac{1}{2} \times(4+2)\times \frac{1}{2}$

= 1 + 3 = 5 2 $\frac{}{2}$ – square units

18. Ans (D)

$\frac{dy}{dx} + \frac{2x-y(2y-1)}{2x-1} = 0$

x, y > 0, y(1) = 1, y (2) = ?

$\frac{dy}{dx} = -\frac{2x(2y-1)}{2y(2x-1)}$

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

$\frac{1}{\ln 2}\int \frac{2y\ln 2}{2y} dy = -\frac{1}{}\int 2^x \ln 2dx$

$\frac{1}{\ln 2}\ln|2y-1| = \frac{-1}{\ln 2}\ln|2x-1| + C$

At x= 1, y = 1

Putting this values in above relation we get C = 0

ln|2y − 1| + ln|2x − 1| = 0

(2x−1)(2y−1)=1

$2y-1 = \frac{1}{2x-1}$

At x = 2

$2y \; 1 = \frac{1}{3} + 1 = \frac{4}{3}$

$y = \log 2\frac{4}{3}$ = log24−log23=2−log23

19. Ans (B)

Let, y = tx

$\frac{dy}{dx} = t + x\frac{dt}{dx}$

$tx\left(t + x\frac{dt}{dx}\right) = x\left(t2 + \frac{\varphi(t2)}{\varphi'(t2)}\right)$

$\therefore t2 + xt\frac{dt}{dx} = t2 + \frac{\varphi(t2)}{\varphi'(t2)}$ $\int \frac{t\varphi'(t2)}{\varphi(t2)}dt = \int \frac{dx}{x}$

Let $\phi(t2) = p$ $\phi'(t2)2tdt = dp$

$\int \frac{dy}{2p} = \int \frac{dx}{x}$ $\frac{1}{2}\ell n\phi \therefore \ell nx + \ell nc$

$\Rightarrow$ $(t2) =$ $\varphi\left(\frac{y^2}{x^2}\right) = kx2$, $\phi(1) = k$

$\phi(t2) = x2k$ $\varphi\left(\frac{y2}{4}\right) = 4\varphi(1)$

20. Ans (C)

$\frac{dy}{dx} = \frac{y(x+y3)}{x(y3-x)}$

$dy(xy3 - x2) = (xy + y4)dx$

$\Rightarrow y3(xdy - ydx) = x(ydx + xdy)$

$\Rightarrow x2y3\, d\left(\frac{y}{x}\right) = x\, d(xy)$

$\Rightarrow \frac{y}{x} d\left(\frac{y}{x}\right) = \frac{d(xy)}{(xy)2}$

$\Rightarrow \frac{1}{2}\left(\frac{y}{-}\right)^2 = \frac{-1}{xy} + c$

Passes through (4, –2) $\Rightarrow$ c = 0

So y3 = –2x

PART 3 : MATHEMATICS

SECTION-B

1. Ans (1)

ex(1 + yex)(dy + ydx) = 2x dx

(1 + yex) (exdy + yexdx) = 2xdx

$\Rightarrow \frac{(1 + yex)2}{2} = x2 + c$

$\Rightarrow yex + 1 = \sqrt{2x2 + 4}$

$\Rightarrow f(-1) = (\sqrt{6} - 1)\, e$

$\therefore$

2. Ans (2)

(xcos x)dy + (xysinx + ycos x – 1)dx = 0,

$0 < x < \frac{\pi}{2}$

$\frac{dy}{dx} + \left(\frac{xsinx+cosx}{x \cos x}\right)y = \frac{1}{x\cos x}$

IF = x secx

$y.xsecx = \int \frac{x \sec x}{x\cos x}dx = \tan x + c$

Since $y\left(\frac{\pi}{-}\right) = \frac{3\sqrt{3}}{\pi}$

Hence $c = \sqrt{3} -$

Hence $\left|\frac{\pi}{6}y\left(\frac{\pi}{6}\right) + y'\left(\frac{\pi}{6}\right)\right| = |-2| = 2$

3. Ans (6)

$\frac{dy}{dx} + \frac{4x}{(x2-1)}y = \frac{x+2}{(x2-1)^{\frac{5}{2}}}$, x > 1

I.F. $= e^{\int \frac{4x}{x2-1}dx}$

I.F. = (x2 – 1)2

$d\left(y.(x2-1)^2\right) = \frac{x+2}{(x2-1)^{\frac{5}{2}}}.(x2-1)^2$

$\Rightarrow \int d\left(y.(x2-1)^2\right) = \int \frac{x+2}{(x2-1)^{\frac{1}{2}}}dx$ ...(1)

$\Rightarrow y(x2-1)2 = \sqrt{x2-1} + 2\ln\left(x + \sqrt{x2-1}\right) + C$

$\Rightarrow C = -\sqrt{3}$

$(x2-1)^2 = \sqrt{x2-1} + 2\ln\left(x + \sqrt{x2-1}\right) - \sqrt{3}$

$\alpha\beta\gamma = 6$

$\Rightarrow$

4. Ans (0)

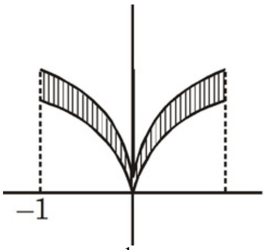
$f(x) = \sin^{-1}\left(\frac{2|x|}{1+x^2}\right) + \sin^{-1}\left(\frac{|x|}{\sqrt{1+x^2}}\right)$

Put $|x| = \tan\theta$, $\theta \in [0, \frac{\pi}{2})$

$\therefore f(x)=\sin^{-1}(\sin 2\theta)+\sin^{-1}(\sin\theta)$

$= \begin{cases} 2\theta + \theta, & \theta \in [0, \frac{\pi}{4}] \\ \pi-2\theta+\theta & \theta \in (\frac{\pi}{4}, \frac{\pi}{2}) \end{cases}$

$\therefore f(x)=3\tan^{-1}|x|, \quad x \in [-1, 1]$



Area $= 2\int_0^1 (3\tan^{-1}x - \tan^{-1}x)dx$

$= 4\int_0^1 \tan^{-1}x\,dx$

$=\pi-\ln 4$

$\therefore [b-a] = [4-\pi] = 0$

5. Ans (2)

P is intersecton point of line AB & 2x + 3y + 1 = 0

P(7,–5)

$\therefore$