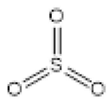
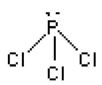
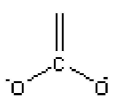
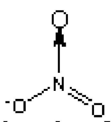
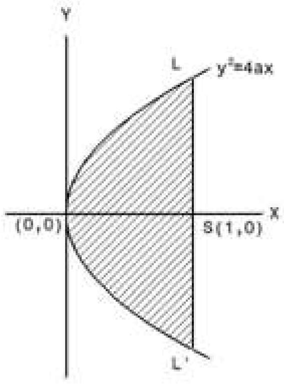
1to1 GURU

Learn to Lead, Learn to Succeed

Date :-04/02/2022 **Time :-25 Minutes** **Exam Name :-MHTCET-1to1Guru-4** **Mark :- 30**

1.	**b**	Let water rises to height h_1 and h_2 in the two limbs. $\therefore$ Then, $h_1 = \frac{2T}{r_1 dg}, h_2 = \frac{2T}{r_2 dg}$ $h_1 - h_2 = \frac{2T}{dg}\left[\frac{1}{r_1} - \frac{1}{r_2}\right]$ $= \frac{2\times 7\times 10^{-2}}{10^{-3}\times 10^{3}\times 10}\left[\frac{1}{1} - \frac{1}{2.5}\right]$ $= 8.4$ mm
2.	**a**	
3.	**a**	
4.	**c**	(c) $\frac{\beta_1}{\beta_2} = \frac{\lambda_1}{\lambda_2}$ or $\frac{1.0}{\beta_2} = \frac{5000}{6000}$ or $\beta_2 = \frac{6000}{5000} = 1.2\ mm$.
5.	**c**	$g = \frac{GM_e}{R^2} = \frac{G}{R^2}\times\frac{4}{3}\pi R^3 \rho = \frac{4}{3}\pi G R \rho$ Hence $\rho = 3g/4\pi GR$
6.	**d**	In P-N-P transistors, majority charge carriers are holes while in case of N-P-N transistors, majority charge carriers are electrons which have greater mobility.
7.	**a**	(a) Applying Newton s law on system along horizontal direction, we have $mc + m(c - b\cos\theta) = 0$ (i) $c = \frac{b\cos\theta}{2}$
8.	**d**	(4) Linkage isomerism is exhibited by ambidentate ligands (ligands having two coordination sites). *e.g.*, NO_2^- . If the bonding is through N, the ligand is named as nitro and if it is through O, it is named as nitrito. $NO_2^- \rightarrow$ nitro N $ONO^- \rightarrow$ nitrito O
9.	**b**	(b) The structure of these molecules/species are as follows :  $(\sigma\text{-}bps + lps = 3 + 0 = 3)$ sp^2-hybridisation trigonal planar  $(\sigma\text{-}bps + lps = 3 + 1 = 4)$ sp^3-hybridisation pyramidal  $(\sigma\text{-}bps + lps = 3 + 0 = 3)$ sp^2-hybridisation trigonal planar  $(\sigma\text{-}bps + lps = 3 + 0 = 3)$ sp^2-hybridisation trigonal planar

		PCl_3 has sp^3 -hybridisation but due to presence of a lone-pair, its shape is pyramidal instead of tetrahedral.
10.	**c**	(c) Ideal gas equation $pV = nRT$ is obeyed by ideal gas in both adiabatic process and isothermal process.
11.	**b**	
12.	**a**	
13.	**d**	
14.	**a**	(A) $k = 0.0112\Omega^{-1}\ cm^{-1}, R = 55.0\Omega$ Cell constant, $b = k \times R$ $= 0.0112\Omega^{-1}\ cm^{-1} \times 55.0\Omega$ $\therefore b = 0.616\ cm^{-1}$
15.	**a**	$\tan\alpha \tan\beta = m_1m_2 = \frac{a}{b} = -\frac{6}{7}$
16.	**a**	(a) $I = \int x^x(1 + \log x)dx$ Put $x^x = t \Longrightarrow x^x(1 + \log x)dx = dt$ $I = \int dt$ $I = x^x + c$
17.	**b**	(b) Let LL be the latus rectum and S(1,0) be the focus Of the parabola $y^2 = 4ax$ $\therefore$ Eq of letus rectum is $x = 1$ $\therefore$ Required area $= 2 \times$ Area of region OSLO  $A = 2\int_0^1 y\,dx$ $A = 2\int_0^1 2\sqrt{x}\,dx$ $A = 4\int_0^1 x^{\frac{3}{2}}\,dx$ $A = 4.\left[\frac{x^{\frac{3}{2}}}{\frac{3}{2}}\right]_0^1$ $A = \frac{8}{3}\left[1^{\frac{3}{2}} - 0\right]$ $A = \frac{8}{3}$ sq. units
18.	**b**	
19.	**d**	

		$\sqrt{2}\cos\left(\frac{\pi}{4}-A\right)=\sqrt{2}\left[\cos\frac{\pi}{4}\cos A+\sin\frac{\pi}{4}\sin A\right]=\sqrt{2}\left[\frac{1}{\sqrt{2}}\cos A+\frac{1}{\sqrt{2}}\sin A\right]$ $=\cos A+\sin A$
20.	**c**	(C) $\sec\theta+\tan\theta=4$ $\therefore \frac{1+\sin\theta}{\cos\theta}=4\Rightarrow 1+\sin\theta=4\cos\theta$ $\therefore \left(\cos\frac{\theta}{2}+\sin\frac{\theta}{2}\right)^2=4\left(\cos^2\frac{\theta}{2}-\sin^2\frac{\theta}{2}\right)$ $\therefore \cos\frac{\theta}{2}+\sin\frac{\theta}{2}=4\left(\cos\frac{\theta}{2}-\sin\frac{\theta}{2}\right)$ $\therefore 5\sin\frac{\theta}{2}=3\cos\frac{\theta}{2}\Rightarrow\tan\frac{\theta}{2}=\frac{3}{5}$ $\sin\theta=\frac{2\tan\frac{\theta}{2}}{1+\tan^2\frac{\theta}{2}}=\frac{2\left(\frac{3}{5}\right)}{1+\left(\frac{3}{5}\right)^2}=\frac{6}{5}\times\frac{25}{34}=\frac{15}{17}$
21.	**b**	(B) Smaller number with 3 different digits is 201 Last number $=698$ Now the digit we have $0,1,2,3,4,5,6,7,8,9$ 1^{st} place can be filled in 5 ways $(2,3,4,5,6)$ 2^{nd} place in 9 ways and 3^{rd} place in 8 ways. $\therefore$ Total number of ways $=5\cdot8\cdot9=360$
22.	**c**	(c) $I=\int x^3e^x dx$ $=x^3e^x-\int 3x^2e^x dx$ $=x^3e^x-3\left[x^2e^x-\int 2x\, e^x dx\right]$ $=x^3e^x-3x^2e^x+6\left[xe^x-\int e^x dx\right]$ $=x^3e^x-3x^2e+6xe^x-6e^x+c$ $=e^x(x^3-3x^2+6x-6)+c$