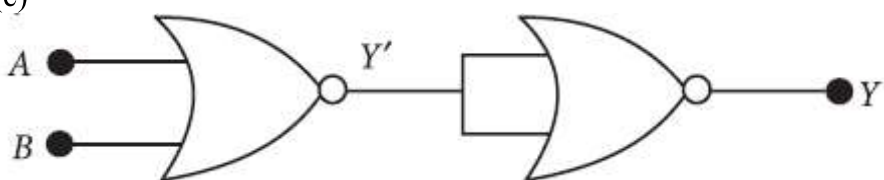
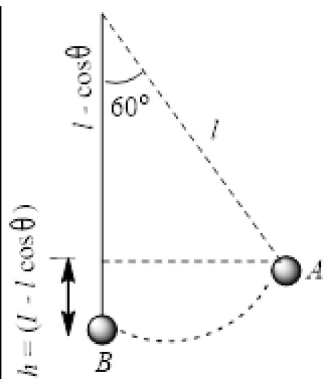




1.	d	(d) $\mu = \frac{F}{R} = \frac{F}{mg} = \frac{98}{100 \times 9.8} = \frac{1}{10} = 0.1$																				
2.	c	<p>(c)</p>  <p>$Y' = \overline{A + B}$. $Y = \overline{\overline{A + B}} = A + B$.</p> <p>Truth table of the given circuit is given by</p> <table><tr><th>A</th><th>B</th><th>Y'</th><th>Y</th></tr><tr><td>0</td><td>0</td><td>1</td><td>0</td></tr><tr><td>0</td><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>0</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td><td>1</td></tr></table>	A	B	Y'	Y	0	0	1	0	0	1	0	1	1	0	0	1	1	1	0	1
A	B	Y'	Y																			
0	0	1	0																			
0	1	0	1																			
1	0	0	1																			
1	1	0	1																			
3.	b	<p>(b) Voltage amplification (gain) is given by</p> $A = \frac{\mu}{1 + \frac{r_p}{R_L}}$ <p>where μ is amplification factor, r_p is plate resistance and R_L is load resistance.</p> <p>Given, $\mu = 36$, $r_p = 10000 \Omega$, $R_L = 30000 \Omega$</p> <p>Putting in the relation, we obtain</p> $A = \frac{36}{1 + \frac{10000}{30000}} = \frac{36}{1 + \frac{1}{3}} = \frac{36 \times 3}{4} = 27$																				
4.	d	<p>(d) KE at the lowest position $= \frac{1}{2} mv^2$</p> $= \frac{1}{2} m(3)^2 = \frac{9}{2} m$ <p>When the length makes an angle $\theta (= 60^\circ)$ to the vertical, the bob of the pendulum will have both KE and PE. If v is the velocity of bob at this position and h is the height of the bob w.r.t. B, then total energy of the bob</p> $= \frac{1}{2} mv^2 + mgh$																				



But $h = l - l \cos \theta$
 $= l(1 - \cos \theta)$
 $= 0.5(1 - \cos 60^\circ) = 0.5 \left(1 - \frac{1}{2}\right) = \frac{1}{4}$
 $E = \frac{1}{2}mv^2 + m \times 10 \times \frac{1}{4}$
 $= \frac{1}{2}mv^2 + \frac{5}{2}m$
 According to law of conservation of energy
 $\frac{1}{2}mv^2 + \frac{5m}{2} = \frac{9}{2}m$
 $\Rightarrow \frac{1}{2}mv^2 = \frac{9}{2}m - \frac{5}{2}m = 2m$
 $\therefore u = 2 \text{ ms}^{-1}$

5.	a	<p>(a) Taking the moment of forces about centre of gravity G</p> <p>$(1.5)gx = 2.5g(16 - x) \Rightarrow 3x = 80 - 5x$ $\Rightarrow 8x = 80 \Rightarrow x = 10 \text{ cm}$</p>
6.	d	(d) $\text{CO}_3^{2-} + \text{H}^+ \rightarrow \text{HCO}_3^- (\text{acid})$.
7.	d	<p>(d) Orthosilicic acid (H_4SiO_4), on heating at high temperature, loses two water molecules and gives silica (SiO_2) which on reduction with carbon gives carborundum (SiC) and CO.</p> <p>$\text{H}_4\text{SiO}_4 \xrightarrow[-2\text{H}_2\text{O}]{1000^\circ\text{C}} \text{SiO}_2 \xrightarrow[\Delta]{\text{C}} \text{SiC} + \text{CO}$</p> <p>carborundum</p>
8.	b	<p>(b) $\text{pH} = 2$ $\therefore [\text{H}^+] = 10^{-\text{pH}} = 10^{-2} \text{ M}$</p>
9.	d	<p>(d) $2\text{HgNO}_3 + 2\text{HCl} \rightarrow \text{Hg}_2\text{Cl}_2 + 2\text{HNO}_3$; Hg_2Cl_2 is insoluble in water.</p>
10.	c	<p>(c) $\text{Mg}^{2+} = [\text{Ne}]$ [Zero unpaired electrons] $\text{Ti}^{3+} = [\text{Ar}]3d^1$ [One unpaired electrons] $\text{Fe}^{2+} = [\text{Ar}]3d^6$ [Four unpaired electrons] $\text{V}^{3+} = [\text{Ar}]3d^2$ [Two unpaired electrons]</p>
11.	a	<p>(a) Nekton and neuston are actively swimming animals which includes, fishes, turtles, whales, seals, etc. Benthos are large numbers and sessile or relatively inactive animals.</p>
12.	a	<p>(1) The organic acid - α-ketoglutaric acid, plays a key role in the synthesis of amino acid. The ammonia formed by nitrogen assimilation (<i>i.e.</i>, reduction of nitrates), reacts with α-ketoglutaric acid to form an amino acid, <i>i.e.</i>, glutamic acid. In this process, α-ketoglutaric acid comes from Krebs cycle and hydrogen is donated by</p>

		the coenzyme NADH or NADPH. The reaction occurs in the presence of enzyme glutamic dehydrogenase
13.	d	(d) Nucleic acids (DNA and RNA) are macromolecules and polymers of nucleotides, building blocks of the nucleic acid are nucleotides, which consists of nitrogenous base, pentose sugar and phosphate, so the elements occurring in nucleic acid are carbon, hydrogen, oxygen, nitrogen and phosphorus.
14.	c	(c) Some genes control phenotypic traits and at the same time they also influence the viability of the individuals. The influence of these genes on viability is such that it may cause death of individual carrying them. Such genes are called lethal genes.
15.	a	(a) : Retroviruses cause cancer in animals including humans. So modified retroviruses are used to transfer desirable genes into animal cells. It is used in gene therapy, in which lymphocytes from blood of patient are taken and grown in culture medium outside the body, a functional gene is introduced by using a retroviral vector into these lymphocytes which are again reintroduced into the patient body.
16.	a	a) Specialized cell junctions occur at many points of cell-cell and cell-matrix contact in all tissues, but they are particularly important and plentiful in epithelium.
17.	a	(a) Insulin is the first hormone produced by culturing <i>E.coli</i> bacteria, in which insulin producing genes have been transferred from human beings.
18.	a	(a) Digestive enzymes are hydrolases.
19.	b	(b) <i>Opuntia</i> is a xerophytic plant, in which, normal leaves are not well developed and fall off very soon and small leaves of axillary buds are transformed into spines. These modified spines are protective and are also helpful in reducing the rate of transpiration.
20.	c	(c) The ultimate source of nitrogen is atmosphere. It is fixed in usable forms by several biological and non-biological agencies. Nitrogen is also present in the soil in the form of nitrates and ammonical salts