Studentpad

NEET PREVIOUS YEAR 2022-23

Time : 90 Min	Pre : Full Portion Paper	Marks : 120

Hints and Solutions

PHYSICS MOCK TEST

01) Ans: **B)** $\frac{\omega M}{M+2m}$

Sol: Apply law of conservation of angular momentum. $I_1\omega_1 = I_2\omega_2$

In the given case $I_1 = MR^2$, $I_2 = MR^2 + 2mR^2$

$\omega_1 = \omega$

Then $\omega_2 = \frac{I_1}{I_2}\omega = \frac{M}{M+2\,m}\omega$

Therefore, the ring will rotate with an angular velocity $\frac{\omega M}{M+2m}$.

CHEMISTRY MOCK TEST

02) Ans: **A)** 2.0×10^{-20} J

Sol: KE of molecule =energy absorbed by molecule - BE per molecule

$=\left(4.4\times10^{-19}\right)-\left(4.0\times10^{-19}\right)\text{J} = 0.4\times10^{-19}$ J

Therefore, kinetic energy per atom $= \frac{0.4\times10^{-19}}{2}\text{J} = 2.0\times10^{-20}$ J

BIOLOGY MOCK TEST

03) Ans: **C)** Epithelial tissue

Sol: In epithelial tissue, at place the adjacent cells form ion-rich gap or cell junctions for intercellular communication and chemical exchange and these junctions probably do not provide physical support.

04) Ans: **C)** Equal to or greater than $\sin^{-1}\left(\frac{3}{4}\right)$

Sol: In total internal reflection, the angle of incidence (i) must be greater than critical angle C

$\because 2\mu_1 = 2$ and $\mu_2 = \frac{3}{2} \quad \Rightarrow 2\sin i \geq \frac{3}{2}\sin 90^\circ$

$\Rightarrow \sin i \geq \frac{3}{4}$

Therefore, the value of $i \geq \sin^{-1}\left(\frac{3}{4}\right)$

05) Ans: **A)** D > C > A > B

Sol: An electron withdrawing group (-I showing group like $-NO_2, -CN$) stabilises the phenoxide ion, so when present, increases the acidity of phenol. On the other hand electron releasing groups (+I showing group like $-CH_3, -C_2H_5$), when present, decrease the acidity of phenol by destabilising phenoxide ion. Hence, the correct order of acidity of given compounds is p-nitrophenol > m-nitrophenol > phenol >methyl phenol

(D) (C) (A) (B)

(due to intermolecular H-bonding)

06) Ans: **C)**

A	B	C
Fixation	Decarboxylation	Regeneration

Sol: A-Fixation (of CO_2 by PEP carboxylase/oxygenase)

B-Decarboxylation

C-Regeneration

07) Ans: **B)** ${}^{m-4}_{n}X$

Sol: ${}^{m}_{n}X \xrightarrow{\alpha} {}_{n-2}X^{m-4} \xrightarrow{2\beta} {}_{n}X^{m-4}$

08) Ans: **D)** 16

Sol: $\therefore$ Number of atomic orbitals in an orbit $= n^2 = 4^2 = 16$

09) Ans: **C)** The food is ground by mandibles and gizzard

Sol: In cockroach, mandibles are a pair of hard, strong, large dark coloured triangular, structures which move in horizontal motion and crush food between them. Gizzard or proventriculus has an outer layer of thick circular muscles and thick inner cuticle forming six highly chitnous plate called teeth. The gizzard acts as the grinding chamber. Mandibles and gizzard helps in grinding the food particles.

10) Ans: **C)** 4.8

Sol: Nuclear radius $r \propto A^{1/3}$, where A is mass numberb $r = r_0A^{1/3}$

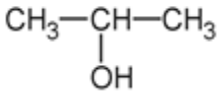
$r = r_0(27)^{1/3} = 3r_0 \quad \Rightarrow r_0 = \frac{3.6}{3} = 1.2$ fm

For ${}^{64}Cu \quad \Rightarrow r = r_0A^{1/3} = 1.2\text{ fm}\,(64)^{1/3}$

$\therefore r = 4.8$ fm

11) Ans: **D)** 2-hydroxypropane

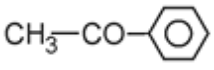
Sol: Out of the given compounds; only



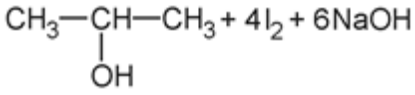
(2- hydroxyprepane) gives yellow precipitate with iodine and alkali (iodoform test). But

$CH_3-COO-CH_3$ (methyl acetate),

$CH_3-CO-NH_2$ (accetamide),



acetophenone do not perform this test because $\alpha-H$ is not active due to +M effect of nearby group.



$\rightarrow \underset{\text{(yellow ppt)}}{\underset{\text{Iodoform}}{CHI_3}}\downarrow + CH_3COONa + 5NaI + 5H_2O$

12) Ans: **C)**

A Ammonotelic	B Ureotelic	C Uricotelic
Aquatic Amphibia	Frog, Humans	Pigeon, Lizards, cockroach

Sol: On the basis of nitrogenous metabolic waste the animals are categories into four types :
(i) Ammonotelic Excreted ammonia, e.g., aquatic animals, bony fishes, frog, toad and crocodile, etc.
(ii) Aminotelic Excreted amino acid, e.g., Mollusca and echinoderms.
(iii) Ureotelic Excreted urea, e.g., frog, toad and mammals.
(iv) Uricotelic Excreted uric acid, e.g., insects, land reptiles and birds.

13) Ans: **D)** an iron rod is inserted in the coil
Sol: As

$$Z=\sqrt{R^2+X_L^2}=\sqrt{R^2+(2\pi fvL)^2}\Rightarrow 1=\frac{V}{Z},P=I^2R$$

Therefore, $V\uparrow, L\uparrow\Rightarrow Z\uparrow, 1\downarrow$ and $P\downarrow$

14) Ans: **B)** H_2O
Sol: All the molecules have O atom with lone pairs, but only H_2O has H atom and no vacant orbital for π bonding. That's why it does not have any π bond. In all other given molecules, the central atom because of the presence of vacant orbitals is capable to farm π bonds.

15) Ans: **C)** Artificial introduction of sperms of a healthy donor into the vagina
Sol: Infertility due to inability of the male to inseminate the female or due to very low sperm counts in the ejaculates can be corrected by artificial insemination.
Ova from the wife/ donor (female) and sperms from the husband / donor (male) are collected and are induced to form zygote under simulated conditions in the laboratory is called test- tube baby programme. Intra Cytoplasmic Sperm Injection (ICSI) is an introduction of sperms of healthy donor directly into the ovary.

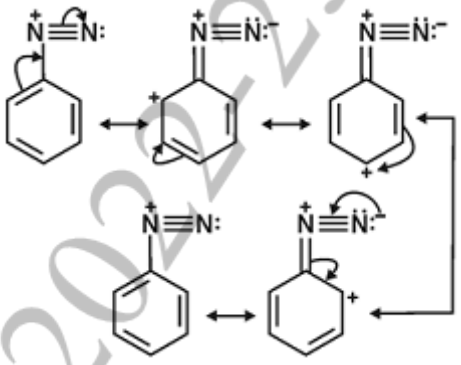
16) Ans: **D)** 22.5 g
Sol: Heat lost by steam=Heat gained by water
Let m' amount of heat converts into water.

$m'\times L=ms\,\Delta t\quad\Rightarrow m'\times 540=20\times 1\times(80-)$

$$\therefore m'=\frac{20\times 70}{540}=2.5\text{ g}$$

Now, net water $=20+2.5=22.5$ g

17) Ans: **B)** $C_6H_5N_2^+X^-$
Sol: Diazonium salt containing aryl group directly linked to the nitrogen atom is most stable because of resonance stabilization between the benzene nucleus and N-atom.



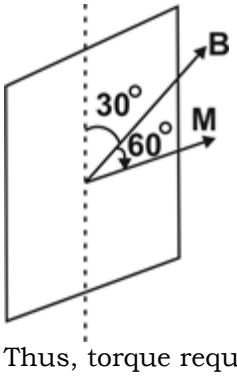
18) Ans: **A)**

A	B	C	D
4	3	1	2

Sol: Correct answers are as follows:
(a) Cetriole: In organism with flagella and cilia, the position of these organelles is determined by the mother centriol which become the basal body.
(b) Chlorophyll: Chlorophyll molecules are specially arranged in and around photosystem that are embedded in the thylakoid membrane of choroplast.
(c) Cristae: These are fold in the inner membrane of mitochondria, which provides a large amount of surface area for chemical reaction.
(d) Ribozomes (Ribonucleic acid enzyme): It is an RNA molecule that is capable of catalysing specific biochemical reactions of nucleic acids.

19) Ans: **B)** 0.20 Nm
Sol: Given, $N=50, B=0.2\text{ Wb/m}^2, I=2A$

$\theta=60°, A=0.12\times 0.1=0.012\text{ m}^2$



Thus, torque required to keep the coil in stable equilibrium i.e.

$\tau=NIAB\sin\theta=50\times 2\times 0.012\times 0.2\times\sin 60°$

$= 50 \times 2 \times 0.12 \times 0.2 \times \frac{\sqrt{3}}{2} = 0.20$ Nm

20) Ans: **A)** Nucleophile is a Lewis acid
Sol: Nucleophiles are electron rich species. Hence, act as a Lewis base but not Lewis acid.

21) Ans: **D)** 0.25
Sol: When a colour blind man $\left(X^C Y\right)$ marries to a woman with normal sight (XX) who has no family history of colour blindness, all of their sons will be normal pure and all of their daughters will be carriers as shown below

Normal woman XX ♀ Colour blind man XY ♂

♀ \ ♂	X^C	Y
X	XX^C	XY
X	XX^C	XY

All carrier daughters | All normal son

So in the next generation, the children of all of their son will be normal in all conditions (except the case in which the wife involved is not carrier neither colour blind). For a carrier daughters.
(i) If they many to a normal man 50% of their grandsons will become colour blind as

Carrier woman XX^C ♀ Normal man XY ♂

♀ \ ♂	X	Y
X	XX	XY
X^C	$X^C X$	$X^C Y$

$X^C Y$ Colour blind son

(ii) If carrier daughter marries to a colour blind man 50% of their grandson will be colour blind along with 50% of the grand daughter while rest 50% of the grand daughters will be carriers as

Carrier woman XX^C ♀ Colour blind man $X^C Y$ ♂

♀ \ ♂	X^C	Y
X	XX^C Carrier	XY Normal
X	$X^C X^C$ Colour blind	$X^C Y$ Colour blind

Daughters | son

So in both the above cases, the result shows 50% of grand sons will be colour blind which in terms of over all progenies (son+daughters) comes as 25% thus confirming the probability as 0.25.

22) Ans: **C)** $\left(2t^3 + 3t^5\right)$ W
Sol: According to question, a body of mass 1kg begins to move under the action of time dependent force, $F = \left(2t\hat{i} + 3t^2\hat{j}\right)$N
where $\hat{i}$ and $\hat{j}$ are unit vectors along X and Y-axis.
$\because F = ma$

$\Rightarrow a = \frac{F}{m} \quad \Rightarrow a = \frac{\left(2t\hat{i} + 3t^2\hat{j}\right)}{1} \{\because m = 1\,kg\}$

$\Rightarrow a = \left(2t\hat{i} + 3t^2\hat{j}\right) m/s^2$

$\because$ acceleration, $a = \frac{dv}{dt}$

$\Rightarrow dv = a\,dt \quad \ldots.(i)$

Integrating both sides, we get $\int dv = \int a\,dt$

$= \int \left(2t\hat{i} + 3t^2\hat{j}\right)dt \quad \Rightarrow v = t^2\hat{i} + t^3\hat{j}$

$\because$ Power developed by the force at the time t will be given as

$P = F.v = \left(2t\hat{i} + 3t^2\hat{j}\right).\left(t^2\hat{i} + t^3\hat{j}\right) = \left(2t.t^2 + 3t^2.t^3\right)$

$P = \left(2t^3 + 3t^5\right)$W

23) Ans: **B)** $\Delta S = 2R\,In\left(\frac{p_i}{p_f}\right)$
Sol: Entropy change is given as,

$\Delta S = nC_p\,In\frac{T_f}{T_i} + nRIn\frac{p_i}{p_f} \quad \ldots.(i)$

For isothermal process, $T_i = T_f$

$\therefore nC_pIn\frac{T_f}{T_i} = nC_pIn\frac{T_i}{T_i} = 0 \quad [In\ 1=0]$

From Eq.(i) $\Delta S = nRIn\frac{p_i}{p_f}$

24) Ans: **B)** Vexillum
Sol: The standard or large upper petal of a

papilionaceous corolla is also called vexillum.

25) Ans: **A)** 

Sol: In the forward biasing of P-N junction, p side of junction diode is connected to higher potential and n side of junction diode is connected to lower potential. Hence, the option (a) is correct answer.

26) Ans: **D)** Displacement with Zn
Sol: **Sol. :** Extraction of gold and silver involves leaching with CN^- ion. Silver is later recovered by distillation of Zn.
In the metallurgy of silver or gold, the respective metal is leached with a dilute solution of NaCN or KCN in the presence of air to obtain the metal in solution as complex. From the complex, metal is obtained later by replacement.
In general,

$$4M(s)+8CH^-(aq)+2H_2O(aq)+O_2(g)\rightarrow$$

$$4\left[M(CN_2)\right]^-(aq)+4OH^-(aq)$$

$$2\left[M(CN_2)\right]^-(aq)+Zn(s)\rightarrow\left[Zn(CN)_4\right]^{2-}(aq)$$

$$+2M(s)$$

M=Ag or Au
This method is known as Mac-Arthur Forest cyanide process.

27) Ans: **D)** Ethidium bromide
Sol: The DNA fragments separated on an agarose gel can be visualised after staining with ethidium bromide. It is intercalating agent and a fluorescent agent. The stained DNA fragments are seen bright orange coloured band under UV-light.
Thinking process Intercalation is the insertion of molecules between the planar bases of DNA. This process is used as a method for analysing DNA. Intercalation occurs, when ligands of an appropriate size and chemical nature fit themselves in between base pairs of DNA. These ligands are mostly polycyclic, aromatic and planar and therefore often make good nucleic acid stains. Intensively studied DNA intercalator include ethidium bromide, proflavine, etc.

28) Ans: **B)** 208.7 J
Sol: According to the question, Heat spent during the conversion of sample of water at $100°C$ to steam is, $\Delta Q = 54\text{ cal} = 54\times 4.18\text{ J} = 225.72\text{ J}$

Normal pressure, $P = 1.013\times10^5\text{ Nm}^{-2}$
Net work done during the conversion would be given as $\Delta W = p\Delta V = p\left[V_{steam}-V_{water}\right]$

Here, $V_{steam} = 167.1\text{ cc} = 167.1\times10^{-6}\text{ m}^3$

$V_{water} = 0.1\text{ g} = 0.1\text{ cc} = 0.1\times10^{-6}\text{ m}^3$

$\therefore \Delta W = 1.013\times10^5\left[(167.1-0.1)\times10^{-6}\right]$

$= 1.013\times467\times10^{-1} = 16.917\text{ J}$

Now, by the first law of thermodynamics, $\Delta Q = \Delta U + \Delta W$

where, ΔU is the change in internal energy of the sample. $\Rightarrow \Delta U = \Delta Q - \Delta W$
Substituting the values in the above equation, we get $\Delta U = 225.72 - 16.917 = 208.7\text{ J}$

29) Ans: **B)** $-NR_2 < -OR < -F$
Sol: (b, c)-I effect is related to the ability of substituting for the electron attraction capacity from the attached carbon atom. i.e. it is based on electronegativity of an atom.
This effect increases with increase in the electronegativity of an atom.
From above we can conclude that option (b) and (c) are correct.

$-NR_2 < -OR < -F\,(-I\text{ effect})$

$-NH_2 < -OR < -F\,(-I\text{ effect})$

Also, options (a) and (d) shows the order of +I effect.

$-NH_2 > -OR > -F\,(+I\text{ effect})$

$-NR_2 > -OR > -F\,(+I\text{ effect})$

30) Ans: **B)**

1	2	3	4
iii	i	iv	ii

Sol: Tidal Volume (TV) is the volume of air inspired or expired during normal breath. It is about 500-55 mL. Inspiratory Reserve Volume (IVR) is the extra amount of air that can be inspired directly after a normal inspiration. It is about 2500-3000 mL. Expiratory Reserve Volume (ERV) is the extra amount of air that can be expired forcibly after a normal expiration. It is about 1000-1100 mL. Residual Volume (RV) is the volume of air which remains still in the lung after the most forceful expiration. It is about 1100-1200 mL. Therefore, option (b) is correct.