MC SQUARE EDUCATION PVT.LTD

PAPER-05

DATE-06/04/2017

NEET 2017 FINAL TEST SERIES

TOTAL MARK: 720

SR.NO	STUDENT NAME	CHEMISTRY		PHYSICS		BIOLOGY		TOTAL MARKS
1	ADWAIT GOKHALE	33	3	28	7	73	8	518
2	RUTUJA VETHEKAR	7	13	1	8	26	26	89
3	JOSHNA CHOUDHARI	11	2	15	15	44	22	241
4	VARUN BELORIA							
5	MAMTA RAJAWAT							
6	AKSHATA SHINDE							
7	RIDDHI RAUT	12	12	12	17	34	24	179
8	ARUNDHATI GOTEKAR	9	3	13	12	45	35	218
9	KOMAL SABBANI	6	14	3	8	45	26	168
10	SHREYA PAREKH	15	17	15	11	32	27	193
11	POOJA UPASE	5	16	4	9	43	25	158
12	ADITYA SASANE	20	8	2	3	57	27	278
13	RUTUJA SASANE	8	6	3	10	46	22	190
14	VIVEK RATHORE							
15	SONAM SINGH							
16	WAJID RAY							
17	RUSHIKESH GHUTUGADE	20	5	7	12	46	22	253
18	SUMIT BORA	29	10	23	8	60	20	410
19	ROHAN PAWAR							
20	PAWAN KHAMKAR	22	12	1	2	59	23	291
21	SUMIT KAMBLE	11	15	5	5	41	32	176
22	SHIVANI SINGH	10	18	2	2	31	29	123
23	VAIBHAV INGOLE							
24	RENUKA KATTIMANI							
25	HARSHA SHINDE	15	18	0	3	46	35	188
26	PAYAL MANE	3	6	1	0	41	11	163
27	AMRUTA MULE	13	17	3	2	27	38	115
28	SHRUTI BARVE	26	7	24	12	65	10	431
29	SIMRAN GURUBAXANI	17	5	23	9	67	17	397
30	SAYALI JADHAV	21	13	12	11	63	12	348
31	AYUSHEE AGARWAL	5	9	2	2	42	26	159
32	ANKITA NIMMALWAR	21	6	3	4	62	22	312
33	SNEHA LOKHANDE	5	16	4	10	41	31	143
34	NEHA CHAVAN	5	8	0	1	20	12	79
35	HIMALI CHOUDHARI							
36	SUMIT SAWANT	25	15	5	5	43	31	241
37	MANALI UBHEDAL	17	6	10	6	58	17	311
38	ANAM PANSARE	14	19	5	18	27	37	110
39	PURVA SHEDGE	19	9	18	10	51	21	312
40	ANJALI SOLANKE							
41	AISHWARIYA NALANAGLU	22	7	0	0	52	20	269
42	AKASHA SANER							
43	SHUBHAM MANE							
44	AMRUTA BHOSALE	10	2	5	2	31	18	162
45	MANASI KASHID	8	8	12	9	24	20	139
46	HARSHADA JADHAV	11	16	0	4	33	41	115
47	RUSHIKESH AWATE	11	27	2	12	29	36	93
48	DIPALI GAIKWAD	10	15	0	1	20	15	89
49	PRITI BIRADAR	11	5	12	6	46	26	239
50	SHEFALI RATHOD	14	7	5	10	37	26	181
51	AISHWARYA BORHADE	3	6	1	4	29	28	94
52	NADEEM SHIKALGAR	18	16	8	13	48	22	245
53	RASHMI GAIKWAD	11	34	13	32	14	76	10
54	YASH RAGHUWANSHI							
55	AVINASH CHENDAKE							
56	RUTUJA GHUTUGADE	10	19	0	1	40	44	136
57	NIRAJ PATIL							
58	KETAN MORE							
59	MADHAVI KATRE	15	16	3	11	30	43	122
60	KETAKI SHINDE	11	10	2	9	24	31	98
61	SONAM BENDRE	13	11	2	3	31	31	139
62	AKASH BAGADE							
63	RAHUL DESHOTWOD	3	10	2	1	33	43	98
64	ASHWINI PATEL	4	6	0	1	41	33	140
65	KANCHAN JAISWAL	9	10	7	11	45	32	191
66	SAMRAGGI HATI	9	10	4	4	32	23	143
67	SONAL KAMBLE	5	4	1	2	25	31	87
68	PRANALI GAIKWAD	14	12	2	2	37	33	165
69	VIJAYA DHUMAL	28	4	20	5	62	13	418
70	DIPTI GURAV	22	8	22	7	55	13	368
71	AKASH BHISE							
72	SHABNAM BANU	16	6	1	3	29	16	159
73	AMRITESH	17	10	4	9	52	31	242
74	DARSHANA V H	11	8	5	4	42	22	198
75	AISHWARYA PATIL	17	15	5	11	42	43	187
76								
77								

NEET
TEST-5-SOLUTIONS

STANDARD ANSWER KEY											
Q	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
A	B	B	C	A	C	D	C	A	C	C	A
Q	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
A	B	A	B	C	D	C	C	B	C	C	C
Q	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**
A	B	C	B	C	D	C	D	C	B	B	A
Q	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**
A	A	A	B	A	B	C	B	B	A	C	B
Q	**45**	**46**	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**
A	A	C	D	A	A	D	C	D	D	A	B
Q	**56**	**57**	**58**	**59**	**60**	**61**	**62**	**63**	**64**	**65**	**66**
A	C	B	C	A	B	B	D	C	B	C	B
Q	**67**	**68**	**69**	**70**	**71**	**72**	**73**	**74**	**75**	**76**	**77**
A	C	D	A	C	D	A	C	B	D	C	B
Q	**78**	**79**	**80**	**81**	**82**	**83**	**84**	**85**	**86**	**87**	**88**
A	B	A	B	A	B	D	D	A	B	C	D
Q	**89**	**90**	**91**	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**
A	D	B	D	D	B	D	C	A	D	D	A
Q	**100**	**101**	**102**	**103**	**104**	**105**	**106**	**107**	**108**	**109**	**110**
A	B	D	A	D	B	B	D	A	B	A	B
Q	**111**	**112**	**113**	**114**	**115**	**116**	**117**	**118**	**119**	**120**	**121**
A	B	C	D	A	D	B	D	C	A	D	B
Q	**122**	**123**	**124**	**125**	**126**	**127**	**128**	**129**	**130**	**131**	**132**
A	B	A	C	A	D	B	A	D	A	B	B
Q	**133**	**134**	**135**	**136**	**137**	**138**	**139**	**140**	**141**	**142**	**143**
A	A	A	D	D	B	D	D	C	B	C	C
Q	**144**	**145**	**146**	**147**	**148**	**149**	**150**	**151**	**152**	**153**	**154**
A	D	B	A	C	A	C	B	B	B	D	C
Q	**155**	**156**	**157**	**158**	**159**	**160**	**161**	**162**	**163**	**164**	**165**
A	A	B	A	C	B	A	D	A	C	A	D
Q	**166**	**167**	**168**	**169**	**170**	**171**	**172**	**173**	**174**	**175**	**176**
A	D	B	D	B	B	B	A	D	B	C	D
Q	**177**	**178**	**179**	**180**							
A	D	B	C	C							

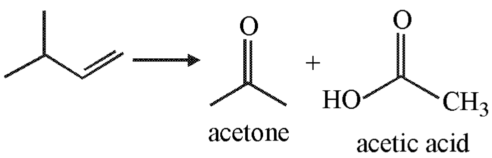
(1) **(B).** This compound is the only hydrocarbon that could contain a C – C triple bond. However, it is worth nothing that C_3H_4 could also have two double bonds instead of one triple bond.

(2) **(B).** In this question, a primary alkyl halide is treated with cyanide, which is a good nucleophile. Primary alkyl halides are not sterically hindered and are readily displaced in S_N2 reactions. Cyanide will displace the bromide to produce 5-methylheptanenitrile in good yield. The correct answer is therefore choice B. An S_N1 reaction will probably not occur because formation of a primary carbocation, which would result from the loss of bromide, is highly unfavorable.

(3) **(C).** The correct answer is choice C, IV> I > II > III, corresponding to: n-heptane > n-hexane > 2-methylpentane > 2,2-dimethylbutane. As the chain length of a straight-chain alkane is increased, the boiling point also increases, approximately 25-30°C for each additional carbon atom. Therefore, n-heptane is expected to boil at a higher temperature than n-hexane. Isomeric alkanes follow a typical trend: as branching increases, boiling point decreases.
Compounds I, II, and III are isomeric hexanes, listed in increasing order of branching. Therefore, n-hexane boils at a higher temperature than 2-methylpentane, which boils at a higher temperature than 2,2-dimethylbutane.

(4) **(A).** Free-radical halogenation reactions are practical only for bromine and chlorine; iodine and fluorine do not react efficiently, and can therefore be eliminated. Bromine radicals react slowly in comparison to chlorine radicals, and are therefore more likely to react in a manner that forms the most stable alkyl radical, i.e., the most substituted radical. This leads to the production of one major bromination product. Chlorine radicals, on the other hand, react so quickly that they become rather indiscriminate, and generally produce several different products. In this particular reaction, two different products are isolated in comparable yields.

(5) **(C).** The double bond of 2-methyl-2-butene is cleaved by hot, basic potassium permangenate to form acetone and acetic acid. If the double-bonded carbon is a monosubstituted carbon, a carboxylic acid is obtained, but if it is a disubstituted carbon, a ketone is obtained.



The C-2 is a disubstituted carbon, so a ketone, $(CH_3)_2C = O$, is obtained; the C-3 is a mono substituted carbon, so an acid, CH_3CO_2H is obtained on reacting it with $KMnO_4$. Thus, the correct choice is C.

(6) **(D).** Ozonolysis of an alkene, and a subsequent treatment with zinc and water, produces carbonyl compounds. The double bond is broken and a disubstituted double-bonded carbon is converted to a ketone, whereas a monosubstituted double bonded carbon is converted to an aldehyde. In this reaction, C-1 is a monosubstituted carbon and C-2 is a disubstituted carbon, and thus the products obtained are a ketone and an aldehyde.

(7) **(C).** Treating alkynes with hot basic $KMnO_4$ leads to the cleavage of the triple bond and the formation of carboxylic acids.

(8) **(A).** In the presence of peroxides, the addition of HBr to the double bond takes place in an anti-Markovnikov manner in a series of free-radical reactions initiated by peroxides.

1. $ROOR \xrightarrow{h\nu} 2RO\bullet$
2. $HBr + RO\bullet \rightarrow ROH + Br\bullet$
3. $CH_3CH = CH_2 + Br\bullet \rightarrow CH_3 - \dot{C}H - CH_2Br$
4. $CH_3 - \dot{C}H - CH_2Br + HBr$
   $\rightarrow CH_3 - CH_2 - CH_2Br + Br\bullet$

In step 3, $CH_3 - \dot{C}H_2 - CH_2Br$ is formed instead of $CH_3 - CHBr - CH_2$, since the more substituted free-radical is more stable than the less substituted one. Thus, the correct choice is A. Note that in the absence of peroxides, HBr adds to the double bond in a Markovnikov manner.

(9) **(C).** Toluene is the common name for methyl benzene: a methyl group attached to a benzene ring. In para-nitrotoluene, the nitro group (NO_2) is attached to the ring directly across from the methyl group. Choice C is the correct response. Choice B is wrong because the nitro group is meta, not para substituted. Choices A and D can be eliminated since nitro groups are not present in these compounds.

(10) **(C).** meta-Dinitrobenzene is the predominant product, since $-NO_2$ is a meta-directing group.

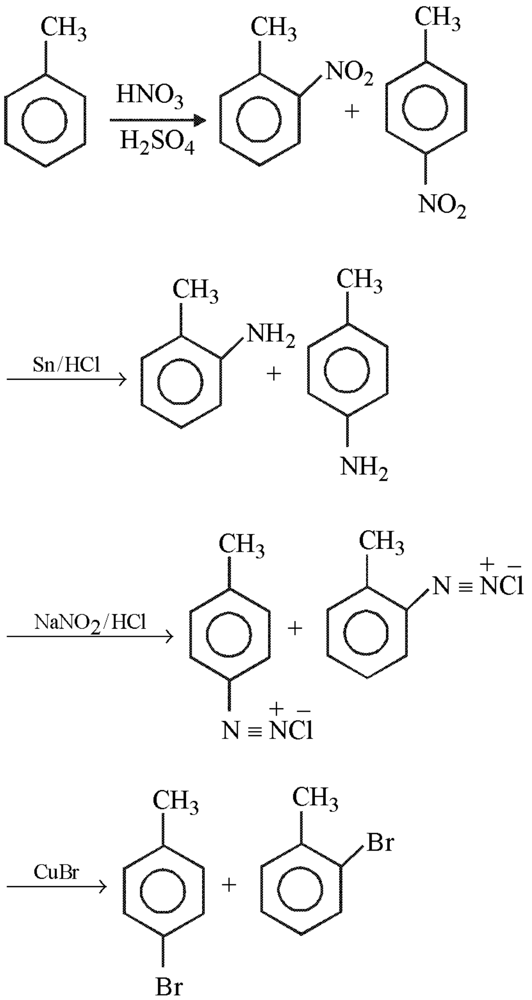
(11) **(A).**

(12) **(B).** This reaction shows bromination of nitrobenzene. This is a trick question, because choices A and D are different views of the same compound. Since aromatic rings are planar, rings that are mirror images are identical (although alkyl substituents of benzene rings may still have chiral centers, and molecules containing such groups may be chiral). B shows meta bromonitro benzene, which is the favored product of this reaction since the nitro substituent is meta-directing. Choices A, C, and D show the ortho and para isomers, which are less favored in this reaction.

(13) **(A).** In order to produce chlorocyclohexane, two different procedures must be carried out: the benzene ring must be chlorinated and then hydrogenated. A suitable way to chlorinate the ring is to use Cl_2 and the Lewis acid $AlCl_3$, which is choice A. Using chlorine in the presence of UV light will not be effective, so choice B is wrong. Choice D is wrong because HCl will not chlorinate the ring.

Now for the second step: hydrogenation. Hydrogenation of the benzene ring can be accomplished by using hydrogen in the presence of a platinum catalyst, so choice A is the correct answer. If the procedure were carried out according to choice C, reduction would occur, forming cyclohexane, but chlorination would not, since cyclohexane is unreactive towards chlorine and the Lewis acid catalyst.

(14) **(B).**

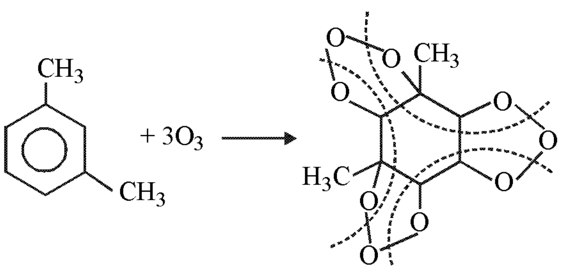


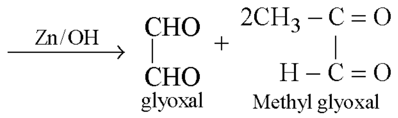
(15) **(C).** It follows Huckel's rule of (4n + 2) π electrons. If we keep n = 0, the total number of π electrons will be 2.

So,  follows the aromaticity rule whereas options (A), (B), (D) have 4π electrons.

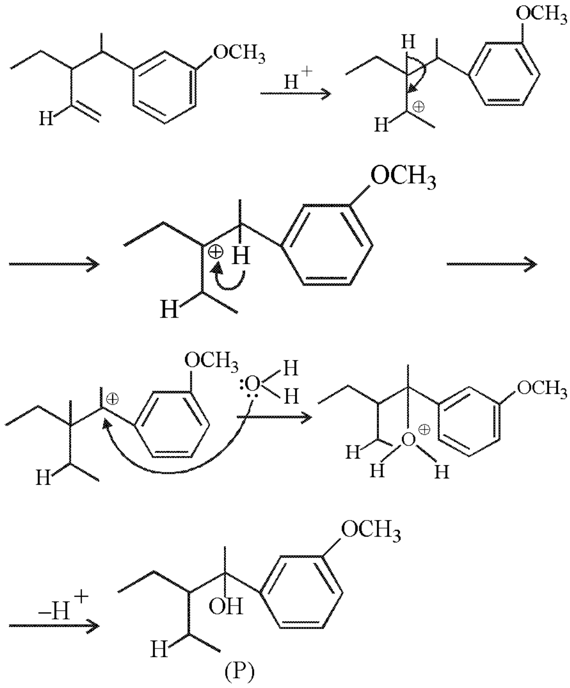
(16) **(D).**

(17) **(C).**





(18) **(C).**



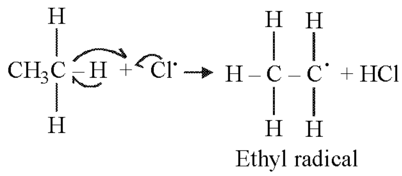
(19) **(B).** Greater is the electron density on aromatic ring, greater is the reactivity towards electrophilic aromatic substitution.

(20) **(C).** Chlorination of ethane takes place by free radical substitution and involves the following steps

Step I : Initiation step

$$Cl_2 \xrightarrow{hv} 2Cl^{\bullet}$$

Step II : Propagation step



$$CH_3\dot{C}H_2 + Cl - Cl \longrightarrow CH_3CH_2Cl + Cl^{\bullet}$$

Step III : Termination step

$$CH_3\dot{C}H_2 + Cl^{\bullet} \longrightarrow CH_3CH_2Cl$$

$$Cl^{\bullet} + Cl^{\bullet} \longrightarrow Cl_2$$

$$2CH_3\dot{C}H_2 \longrightarrow CH_3CH_2CH_2CH_3$$

(21) **(C).** Oxides of nitrogen and sulphur are responsible for acid rain. $NO_2 + H_2O \rightarrow HNO_3$

$$SO_2 \xrightarrow{[O]} SO_3 + H_2O \rightarrow H_2SO_4$$

Due to the presence of HNO_3 and H_2SO_4 (strong acids) rain water becomes acidic and rain is called the acid rain.

(22) **(C).** Methyl isocyanate (MIC) gas is responsible for Bhopal gas tragedy in 1984. Methyl isocyanide reacts with O_3 on HgO to form methyl isocyanate.

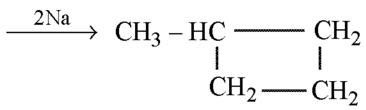
(23) **(B).** Ozone layer is present in stratosphere above 20 km from the earth's surface.

(24) **(C).** Water pollution is measured by BOD (biochemical oxygen demand) and BOD is a standardised measurement of the amount of oxygen required by microorganism to cause the decomposition of organic matter over a period of 5 days at 20°C.

$$BOD = \frac{\text{weight of oxygen (in mg)}}{\text{volume of water sample (in L)}}$$

Given, Weight of oxygen = 0.2 g = 200 mg
Volume of solution = 5 L
BOD = 200/5 mg / L = 40 mg / L = 40 ppm

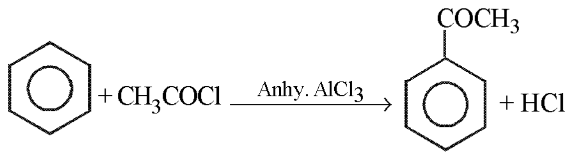
(25) **(B).** $H_2C(Br)-CH_2-CH_2-CH(Br)-CH_3$



Methyl cyclobutane

(26) **(C).** $CH_4 + Cl_2 \rightarrow CH_3Cl + HCl$
$CH_3Cl + 2Na + Cl-CH_3 \rightarrow CH_3-CH_3 + 2NaCl$

(27) **(D).**



This is Friedel Crafts acylation.

(28) **(C).**

(29) **(D).** $CH_3Cl + AlCl_3 \rightarrow CH_3^+ + AlCl_4^-$

(30) **(C).** $CH_2=CH_2 \xrightarrow{\text{Conc. } H_2SO_4} CH_5-CH_2-HSO_4$ (A) (addition reaction)

$CH_3CH_2-HSO_4 \xrightarrow{\Delta, H_2O}$ (B) (hydrolysis)

$CH_3CH_2-OH \xrightarrow{PBr_3} CH_3CH_2-Br$ (C) (bromination)

$CH_3CH_2-Br \xrightarrow{\text{Alco. KOH } (\Delta)} CH_2=CH_2$ (dehydro halogenation)

(31) **(B).** In Wurtz reaction haloalkanes are converted to aliphatic saturated higher hydrocarbons.

(32) **(B).** Benzene doesnot contain 3 single bonds and 3 double bonds. They are all partially double due to resonance.

(33) **(A).** Linseed oil is highly unsaturated.

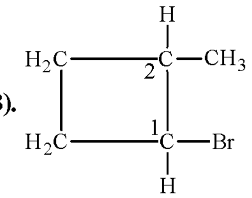
(34) **(A).**

(35) **(A).**

(36) **(B).** Molecular formula = C_5H_8
$CH_3-CH_2-CH_2-CH\equiv CH$ 1-Pentyne
$CH_3-CH_2-C\equiv C-CH_3$ 2-Pentyne
$H_3C-CH(CH_3)-C\equiv CH$ 3-Methyl-1-Butyne

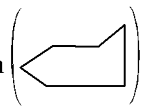
(37) **(A).** $CH_3-Cl < CH_3-Br < CH_2Br_2 < CHBr_3$

(38) **(B).**



Number of asymmetric c-atoms = (n) = 2
$\therefore$ Total number of optical isomers = $2^n = 2^2 = 4$

(39) **(C).** Most energetic conformation (least stable) of cyclohexane is half chair form



(40) **(B).** $(H_3C)_2CHCH_3 \xrightarrow[KMnO_4]{[O]} (CH_3)_2COH$
Isobutane t-butanol

(41) **(B).** Because acidic hydrogen is present in $CH_3-CH=CH-C\equiv CH$ and this can be replaced by Ag atom.

(42) **(A).** A is trialkyl borane, reacts with NH_2Cl in NaOH gives alkyl amine.

(43) **(C).**

(A) $CH_3\boxed{Cl + 2Na + Cl}-CH_3 \rightarrow \underset{\text{Ethane}}{CH_3-CH_3}$

(B) $CH_3\boxed{Cl + 2Na + Cl}-CH_2-CH_3 \rightarrow \underset{\text{Propane}}{CH_3-CH_2-CH_3}$

(C) $CH_3-CH_2\boxed{Cl + 2Na + Cl}-CH_2-CH_3 \rightarrow \underset{\text{Butane}}{CH_3-CH_2-CH_2-CH_3}$

(44) **(B).** Substitution of 2° H will be fast.

(45) **(A).** In ethyne, hydrogen atoms can be libereated as protons more easily as compared to ethene and ethane.

(46) **(C).** Unlike an oscillating spring, the period of a pendulum does not depend on its mass, so you should immediately eliminate (D). Now look at the equation for the period of a pendulum: $T_p = 2\pi\sqrt{\frac{\ell}{g}}$

If the length, ℓ, is 10m, then ℓ/g equals

$\frac{10m}{(10m/s^2)} = 1\,s^2$ and $\sqrt{\frac{\ell}{g}} = 1\,s$. Therefore, the correct answer for the period is $T_p = 2\pi s$.

(47) **(D).** Because the speed of sound is f λ, all you have to do here is multiply 2 m by 140 Hz. Notice that the other choices express incorrect ways that one might combine the given numbers (e.g., 138 is 140 minus 2).

(48) **(A).** This is a standing wave with fixed ends. The harmonic wavelengths for the fixed-fixed condition are given by $\lambda_n = \frac{2}{n}L$. Because n is an integer, λ_n must be a fraction of 16 (2 × 8). Non-allowed wavelengths must therefore be greater than 16, leaving (A) as the only viable choice. You can also eliminate the other answers by showing that $16 = \frac{16}{1}, 8 = \frac{16}{2}, 2 = \frac{16}{8}$, and $0.5 = \frac{16}{32}$.

(49) **(A).** As you probably know, sound travels faster through solids and liquids than it does through gases. Because this is the case, the reflected wave is not phase shifted relative to the incident wave. Further, the transmitted wave is always in phase with the incident wave, which means that the transmitted and reflected waves must be in phase with each other.

(50) **(D).** The Doppler formula for a sound source moving away predicts a decrease in the observed frequency when compared with the emitted frequency. This allows you to eliminate the first three choices. If you recall, the formula for the shifted frequency in this case is

$f' = f\frac{v}{v + v_s}$. Since the source is moving at the speed of sound, the fraction is equal to 1/2.

(51) **(C).** The swings act as pendulums. The period of a pendulum depends on the length of the pendulum and the local acceleration of gravity, not the mass on the end of the pendulum. If the swings both have the same length, they will swing back and forth in the same amount of time (i.e., they will have the same period, regardless of the weight of the person on the swing). Both the child and the adult take the same amount of time to make a complete oscillation.

(52) **(D).** To determine the velocity of the mass, we need to consider the sum of the kinetic and potential energies of the oscillating mass and spring. This sum will equal the initial energy as represented by the work done to give the mass its initial displacement to A. At this initial displacement, the mass is not moving, so all the energy is potential energy, given by $E_{total} = \frac{1}{2}kA^2$

For any other displacement, x, this total energy is split between kinetic and potential energies according to

$$E_{total} = \frac{1}{2}kA^2 = \frac{1}{2}mv^2 + \frac{1}{2}kx^2$$

Solving this for v yields $v = \sqrt{\left(\frac{k}{m}\right)(A^2 - x^2)}$

(53) **(D).** We take the first time derivative of the displacement function to get the velocity.

$$v(t) = \frac{dx}{dt} = \frac{d}{dt}4\cos\left(2t + \frac{\pi}{3}\right) = -8\sin\left(2t + \frac{\pi}{3}\right)$$

At t = 0, this works out to be

$$v(0) = -8\sin\left(2(0) + \frac{\pi}{3}\right) = -6.92 \text{ m/s}$$

(54) **(A).** We take the first time derivative of the velocity function to get the acceleration.

$$a(t) = \frac{dv}{dt} = \frac{d}{dt}\left(-8\sin\left(2t + \frac{\pi}{3}\right)\right)$$

$$= -16\cos\left(2t + \frac{\pi}{3}\right)$$

Now we calculate the acceleration at t = 0.

$$a(0) = -16\cos\left(2(0) + \frac{\pi}{3}\right) = -8 \text{ m/s}^2$$

(55) **(B).** $\frac{V}{4\ell_1} - \frac{V}{4\ell_2} = \frac{16}{20}$

$$V = \frac{4}{5}\left(\frac{4\ell_1\ell_2}{\ell_2 - \ell_1}\right) = \frac{4}{5} \times \frac{4 \times 1 \times 1.01}{1 \times 10^{-2}} = 323.2 \text{ m/s}$$

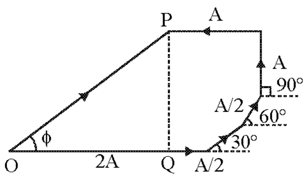
(56) **(C).** $T_1 = 2\pi\sqrt{\frac{M}{k_1}}$ or $k_1 = \frac{4\pi^2 M}{T_1^2}$ and $k_2 = \frac{4\pi^2 M}{T_2^2}$

In series combination,

$$k_{eff} = \frac{k_1 k_2}{k_1 + k_2} = \frac{4\pi^2 M}{T_1^2 + T_2^2}$$

$$\therefore \quad T = 2\pi\sqrt{\frac{M}{k_{eff}}} = \sqrt{T_1^2 + T_2^2}$$

(57) **(B).**



$$y_1 = 2A\sin\omega t; \quad y_2 = \frac{A}{2}\sin\left(\omega t + \frac{\pi}{6}\right)$$

$$y_3 = \frac{A}{2}\sin\left(\omega t + \frac{\pi}{3}\right); \; y_4 = A\sin\left(\omega t + \frac{\pi}{2}\right)$$

$$y_5 = A\sin(\omega t + \pi)$$

By phasor diagram, $\tan\phi = \frac{PQ}{OQ} = 1 \Rightarrow \phi = 45°$

(58) **(C).**
(A) $(\cos\omega t + \sin\omega t)$ is a periodic function. It can also be written as $\frac{\sqrt{2}}{\sqrt{2}}\sin\omega t + \frac{\sqrt{2}}{\sqrt{2}}\cos\omega t$

$$= \sqrt{2}\left(\cos\frac{\pi}{4}\sin\omega t + \sin\frac{\pi}{4}\cos\omega t\right)$$

$$= \sqrt{2}\sin\left(\omega t + \frac{\pi}{4}\right) = \sqrt{2}\sin\left(\omega t + \frac{\pi}{4} + 2\pi\right)$$

$$= \sqrt{2}\sin\left[\omega\left(t + \frac{2\pi}{\omega}\right) + \frac{\pi}{4}\right]$$

This represent a simple harmonic function with period $\frac{2\pi}{\omega}$ and phase $\frac{\pi}{4}$.

(B) $\sin\omega t - \cos\omega t$ is a periodic function. It can be written as $\sqrt{2}\left[\sin\omega t\cos\frac{\pi}{4} - \cos\omega t\sin\frac{\pi}{4}\right]$

$$= \sqrt{2}\sin\left(\omega t - \frac{\pi}{4}\right) = \sqrt{2}\sin\left[\omega\left(t + \frac{2\pi}{\omega}\right) - \frac{\pi}{4}\right]$$

This represent a simple harmonic function with period $\frac{2\pi}{\omega}$.

(C) $F(t) = 1 - \sin 2\omega t$

This is a non-periodic function.

(D) $F(t) = \sin\omega t + \cos(\omega t + \alpha)$

Also represent a simple harmonic function.

(59) **(A).** Here, $\nu_1 = 499$ Hz, $\nu_2 = 501$ Hz

Frequency heard $= \frac{\nu_1 + \nu_2}{2} = \frac{499 + 501}{2} = 500$ Hz

Since the difference in intensity is 2, change in intensity take place twice.

(60) **(B).** Maximum velocity $V_{max} = A\omega = A\sqrt{\frac{K}{m}}$

$$(V_{max})_A = (V_{max})_B$$

$$A_A\sqrt{\frac{K_1}{m}} = A_B\sqrt{\frac{K_2}{2m}} \Rightarrow \frac{A_A}{A_B} = \sqrt{\frac{K_2}{2K_1}}$$

(61) **(B).** We know that, $n' = n\left[\frac{v}{v - v_s\cos\theta}\right]$

Hence, $n' = 640\left[\frac{340}{340 - \frac{100}{3}\times\frac{3}{5}}\right] = 640\left[\frac{340}{340 - \frac{100}{5}}\right]$

$$n' = 640 \times \frac{340}{320} = 2 \times 340 = 680 \text{ Hz}$$

(62) **(D).** Frequency of closed organ pipe for first harmonic

$$n_1 = \frac{v_1}{4\ell_1}$$

Frequency of open organ pipe for third harmonic

$$n_3 = \frac{3v_2}{2\ell_2}$$

At resonance, $n_1 = n_3$

or $\frac{v_1}{4\ell_1} = \frac{3v_2}{2\ell_2}$

or $\frac{\ell_1}{\ell_2} = \frac{1}{6}\left(\frac{v_1}{v_2}\right) = \frac{1}{6}\sqrt{\frac{B}{\rho_1}} \times \sqrt{\frac{\rho_2}{B}} = \frac{1}{6}\sqrt{\frac{\rho_2}{\rho_1}}$

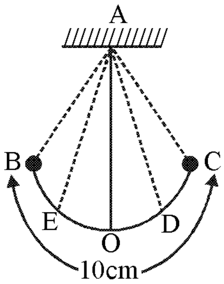
(63) **(C).** Particle is executing SHM.

Since, T = 6s

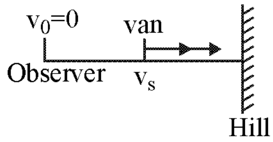
Obviously, time taken from O to C will be 3s

So, time taken from C to D

$$= \frac{T}{4} = \frac{6}{4} = 1.5 \text{ s}$$



(64) **(B).**



Let the velocity of siren-source is v_s.

Van goes away from observer and towards to hill.

Given that n = 1000 Hz (actual frequency)

Let n' is apparent frequency for observer in first condition.

n' = 970 Hz (apparent frequency)

$$n' = n\left(\frac{v}{v + v_s}\right) \text{ or } 970 = 1000\left(\frac{330}{330 + v_s}\right)$$

or $(330 + v_s) = \frac{330}{97} \times 100 \Rightarrow v_s = \frac{330 \times 3}{97}$

For second condition, when sound reflects from the hill and approaches the observer,

$$n'' = n\left(\frac{v}{v - v_s}\right)$$

$$n'' = 1000\left(\frac{330}{330 - \frac{330\times 3}{97}}\right) = 1000\left(\frac{330 \times 97}{330\,(97 - 3)}\right)$$

$$= 1000\left(\frac{97}{94}\right) = 500\left(\frac{97}{47}\right) = 1031 \text{ Hz}$$

(65) **(C).** For interference phenomenon, we know that when two waves of equal frequency propagate same medium and same direction, then interference phenomenon takes place.

Here waves, $y_1 = a\sin(\omega t + \phi_1)$

$y_3 = a'\sin(\omega t + \phi_2)$

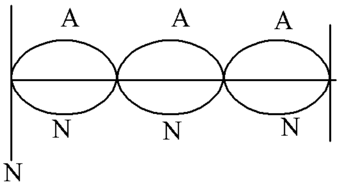
have equal frequency, hence they will produce interference.

(66) (B). $KE = \frac{1}{2}m\omega^2(A^2 - y^2),\ y = \frac{A}{2}$

$U = \frac{1}{2}m\omega^2 y^2$

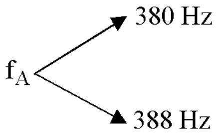
$$\frac{KE}{U} = \frac{A^2 - y^2}{y^2} = \frac{A^2 - \frac{A^2}{4}}{\frac{A^2}{4}} = \frac{3A^2}{4} \times \frac{4}{A^2} = \frac{3}{1}$$

(67) (C).



2^{nd} overtone = 3^{rd} Harmonic

(68) (D). $f_B = 384$ Hz



When 388 Hz filed the frequency away from 384 Hz and Beats increases.

(69) (A). The time period, $T = 2\pi\sqrt{\frac{\ell}{g}}$, where ℓ is the length of simple pendulum.
On standing the effective length of the pendulum measured from the point of suspension decreases. Hence, the time period of cradle decreases.

(70) (C). $f' = \left(\frac{v + v_s}{v - v_s}\right)f = \left(\frac{330 + 4}{330 - 4}\right) \times 90 \times 10^3$

$= 92.1 \times 10^3$ Hz

(71) (D). $f_o - f_c = 2$ but $f_o = 2f_c$ (when lengths are same)
$\therefore\ f_c = 2$ Hz and $f_o = 4$ Hz ; $f_o' = 8$ Hz, when I is halved
$f_c' = 1$ Hz, when I is doubled $\quad \therefore\ f_o' - f_c' = 7$

(72) (A). $f = \frac{1}{2L}\sqrt{\frac{T}{m}} = \frac{1}{2L}\sqrt{\frac{T}{\rho\pi D^2}}\ \therefore f \propto \frac{1}{LD}$

(73) (C). $y = 10 \sin\left(\frac{2\pi}{45}t + \alpha\right)$

If $t = 0, y = 5$ cm
$5 = 10 (\sin\alpha) \Rightarrow \sin\alpha = 1/2 \Rightarrow \alpha = \pi/6$
If $t = 7.5$ s

Then total phase $= \frac{2\pi}{45} \times \frac{15}{2} + \frac{\pi}{6} = \frac{\pi}{3} + \frac{\pi}{6} = \frac{\pi}{2}$

(74) (B). $n_A = 258$ Hz, $n_B = 262$ Hz
Let n is the frequency of unknown tuning fork.
It produces x beats with 258 and 2x with 262
$262 - (258 - x) = 2x$
$262 - 268 + x = 2x \Rightarrow x = 4$; $n = 254$ Hz

(75) (D). $f = \frac{1}{2\ell r}\sqrt{\frac{T}{\pi\rho}} \Rightarrow \frac{f_1}{f_2} = \frac{\ell_2}{\ell_1} \times \frac{r_2}{r_1} \times \sqrt{\frac{T_1}{T_2}}$

$\frac{600}{f_2} = \frac{2}{1} \times \frac{1}{2} \times \sqrt{\frac{T}{T/9}} = 3 \Rightarrow f_2 = 200$ Hz

(76) (C).

(77) (B). $I_L = 10\log\left(\frac{I}{I_0}\right)dB = 10\log\left(\frac{10^{-8}}{10^{-12}}\right)$

$= 10 \log (10^4) = 40$ dB

(78) (B). $y = 0.05 \sin(2\pi t - 0.02\pi x)$

$\frac{2\pi}{\lambda} = 0.02\pi \quad [v = f\lambda = 1 \times 100 = 100 \text{ m/s}]$

$\lambda = 100$ m

(79) (A). $f_c = \frac{3v}{4\ell_c}$; $f_0 = \frac{3v}{2\ell_0}$; $\frac{3v}{4\ell_c} = \frac{3v}{2\ell_0} \Rightarrow \frac{\ell_0}{\ell_c} = 2:1$

(80) (B). $\frac{f'}{f} = \frac{v + v_0}{v - v_0} \quad (\because v_s = v_0)$

$\frac{f' - f}{f} = \frac{\Delta f}{f} = \frac{v + v_0 - v + v_0}{v - v_0}$

$\Delta f = \frac{2v_0}{v - v_0}f = \frac{2 \times 2 \times 338}{338} = 4$

(81) (A). Linear density,

$m = \frac{\text{mass}}{\text{length}} = \frac{10 \times 10^{-3}}{1} = 10 \times 10^{-3}\text{ kg/m}$

$v = \sqrt{\frac{T}{m}} = \sqrt{\frac{100}{10 \times 10^{-3}}} = 100\text{ m/s}$

(82) (B). $f' = \left(\frac{V}{V - V_s}\right)f = \left(\frac{340}{340 - 10}\right)340 = 350.3$ Hz

(83) (D). $f_n = n \times f_1 = n \times \left(\frac{f}{2\ell}\right)$

$1100 = n \times \frac{330}{2 \times 0.30} \Rightarrow n = 2$

(84) (D). $V_s = \sqrt{\frac{Y}{\rho}} = \sqrt{\frac{10^{11}}{10.0 \times 10^4}} = 10^3\text{ m/sec}$

$t = \frac{2\ell}{v_s} = \frac{2 \times 100}{1000} = 0.2$ sec

(85) (A). Apparent frequency

$$n' = n\frac{(u+v_w)}{(u+v_w - v_s\cos 60°)} = \frac{510\,(330+20)}{330+20-20\cos 60°}$$

$$= 510\times\frac{350}{340} = 525\text{ Hz}$$

(86) (B). $A_1 = \sqrt{5^2+(5\sqrt{3})^2} = 10$; $A_2 = 5$; $\frac{A_1}{A_2} = \frac{2}{1}$

(87) (C). $y = A\sin\left(\frac{2\pi}{T}\right)t$

$$\frac{A}{2} = A\sin\left(\frac{2\pi}{T}\right)t\ ;\ \frac{2\pi}{T}t = \frac{\pi}{6}\ ;\ t = \frac{T}{12} = \frac{6}{12} = \frac{1}{2}$$

(88) (D). A = 0.2 m, T = 24 s

$$y = A\sin\frac{2\pi}{T}t\ ;\ 0.1 = 0.2\sin\frac{2\pi}{T}t$$

$$\frac{1}{2} = \sin\frac{2\pi}{T}t\ ;\ \frac{2\pi}{T}t = \frac{\pi}{6}\ ;\ t = \frac{T}{12} = \frac{24}{12} = 2$$

(89) (D).

(90) (B). Irrespective of amplitude, they take same time to reach B. i.e. (T/4) s.

$$T = 2\pi\sqrt{\frac{\ell}{g}} = 2\times 3.142\sqrt{\frac{1}{10}} = 2s$$

(91) (D). From the right ventricle, blood passes into the pulmonary arteries, lungs, and pulmonary veins, then back to the heart by entering the left atrium.

(92) (D). The left ventricle connects to the aorta and has the thickest wall of all the chambers because it has to pump the blood out to the entire body.

(93) (B). The mitral valve keeps blood flowing in one direction from the left atrium to the left ventricle.

(94) (D). The aorta sends blood from the left ventricle out to the body. Although not shown in this sketch, it divides into an ascending aorta which sends blood to the head and a descending aorta that sends blood downward to the major organs and the rest of the body.

(95) (C). The pulmonary vein brings blood from the lungs to the left atrium. It is the only vein that carries oxygenated blood.

(96) (A). Filtration is the nonselective diffusion of all substances small enough to pass through the glomerulus membrane and into Bowman's capsule.

(97) (D). All digestion is completed in the small intestine. One function of the large intestine is water reabsorption. Bile is produced by the liver and stored in the gallbladder. It is an emulsifier that breaks apart fats. The lacteal is located inside the villus in the small intestine. It is part of the lymphatic system and absorbs fatty acids and glycerol from the small intestine. Secretin is a hormone released by the duodenal wall that stimulates the pancreas to release bicarbonate to neutralize acid in the duodenum.

(98) (D). Normal blood clotting requires the following: thromboplastin, thrombin, fibrinogen, fibrin, calcium ions, thrombocytes, and platelets. In addition, other clotting factors are required. Macrophages fight infection.

(99) (A). The posterior pituitary secretes oxytocin, which stimulates uterine contractions as well as the production of milk from mammary glands. The posterior pituitary also secretes antidiuretic hormone, which targets the kidney.

(100) (B). Positive feedback is characterized by an enhancement of something that is already occurring and continues to an endpoint. Negative feedback maintains homeostasis (it does not reach an endpoint) by increasing or decreasing levels. Choices A, C, D are all examples of negative feedback.

(101) (D). The collecting tube is under the control of antidiuretic hormone from the posterior pituitary. ADH controls the permeability of the collecting tube. If ADH is released, the collecting tube becomes more permeable to water and more water passes into the surrounding tissue and back into the bloodstream. As a result, less urine is produced. If no ADH is released, the reverse situation occurs; large amounts of dilute urine are produced.

(102) (A). Simple diffusion occurs during filtration, as molecules that are small enough diffuse from the glomerulus to Bowman's capsule. This is the least selective process in the formation of urine in the nephron.

(103) (D). The lower portion of the ascending loop of Henle is impermeable to water. The control of the flow of water in and out of the nephron is critical to the normal functioning of the nephron.

(104) (B). Affinity of carbon monoxide for haemoglobin is 200 times more than oxygen. At 0.5 partial pressure, CO combines with 50% of haemoglobin.It produces a relatively stable compound called carboxy-haemoglobin. This causes low supply of oxygen to the body which is characterised by headache, dizziness, nausea, etc.

(105) (B). Binding of antibodies to the antigens produces a large insoluble complex known as agglutination. It is a specific reaction, i. e., a particular antigen will only clump in the presence of its specific antibody. Each antibody has two antigen binding sites. It combines with two antigens, causing them to agglutinate.

(106) (D). Simple or unconditional reflexes are present in an individual right from birth. They are specific, predictable, purposeful and have survival value, e.g. breast feeding and swallowing in newly born babies and blinking of eyes are examples of unconditioned reflexes. (A), (B) and (C) are the examples of conditional reflexes and are not present at birth but develop later in life through learning habit.

(107) (A). A patient of diabetes mellitus is unable to produce or fail to utilize insulin hormone. Thus, he is unable to store glucose in the form of glycogen. Hence, he started to excrete glucose in the urine. A patient is kept in carbohydrate free diet yet he excretes glocose in urine becuase high level of glucose not only depends on dietary carbohydrates but also on glycogenolysis (degradation of glycogen in liver) and gluconeogenesis (breakdown of fats into glucose in adipose tissues and covers ion of muscle lactate into glucose via cori cycle).

(108) (B). Secretin and cholecystokinin are secreted by Brunner's gland located in duodenum. Secretin causes the pancreas to secrete alkaline pancreatic juice and stimulates bile production in the liver. Cholecystokinin induces the gall bladder to contract and eject bile into the intestine and stimulates the pancreas to secrete its digestive enzymes.

(109) (A).

(110) (B). Patella is a sesamoid bone. Sesamoid bones are small rounded masses of bones formed in tendons at the joints where they are subjected to great pressure.

(111) (B). The organ of Corti consists of outer hair cells, inner hair cells, inner pillar cells, outer pillar cells, tunnel of Corti, phalangeal cells (cells of Deiters), cells of Hensen and cells of Claudius. The sensory hairs project from the outer ends of the hair cells into the scala media, while from the inner end of the cells nerve fibres arise, which unite to form the cochlear nerve.

(112) (C). Human beings have a significant ability to maintain and moderate the respiratory rhythm to suit the demands of the body tissues. A specialised centre present in the medulla region of the brain called respiratory rhythm centre is primarily responsible for this regulation. A chemosensitive area is situated adjacent to the rhythm centre which is highly sensitive to CO_2 and hydrogen ions. Increase in these substances can activate this centre, which in turn can signal the rhythm centre to make necessary adjustments in the respiratory process by which these substances can be eliminated.

(113) (D). The P-wave represents the electrical excitation (or depolarisation) of the atria, which leads to the contraction of both the atria. The QRS complex represents the depolarisation of the ventricles, which initiates the ventricular contraction. The T-wave represents the return of the ventricles from excited to normal state (repolarisation). So, by counting the number of QRS complexes that occur in a given time period, one can determine the heart beat rate of an individual.

(114) (A). Gonadotropin releasing hormone (GnRH), stimulates the anterior lobe of the pituitary gland to secrete two gonadotropic hormones, follicle stimulating hormone (FSH) and luteinising hormone (LH). In male LH activates the Leydig's (interstitial) cells of the testis to secrete androgens.

(115) (D). The T wave represents the repolarization (or recovery) of the ventricles. The end of the T-wave marks the end of systole. The P-wave represents the electrical excitation (or depolarisation) of the atria, which leads to the contraction of both the atria. The QRS complex represents the depolarisation of the ventricles, which initiates the ventricular contraction.

(116) (B). In descending limb of loop of Henle, the water is reabsorbed from filtrate flowing in it due to increasing osmolarity of interstitial fluid. Sodium and other solutes are not reabsorbed here. The filtrate becomes hypertonic to blood plasma. All nephrons have their renal Malphigian corpuscles in the cortex. Cortical nephrons have their loop of Henle in the renal medulla near its junction with the renal cortex, while the loop of Henle of juxtamedullary nephrons is located deep in the renal medulla; they are called juxtamedullary because their renal corpuscle is located near the medulla (but still in the cortex).

(117) (D). Each actin (thin) filament is a polymerised protein made up of two 'F' (fibrous) actin strands helically wound to each other. Each 'F' actin is a polymer of monomeric 'G' (globular) actins. It is light in colour & shows isotropic property.

(118)	(C)	**(119)**	(A)
(120)	(D)	**(121)**	(B)
(122)	(B)	**(123)**	(A)
(124)	(C)	**(125)**	(A)
(126)	(D)	**(127)**	(B)
(128)	(A)	**(129)**	(D)

(130) (A). Cells of Leydig (Insterstitial cells) Scorete the 'testosterune' hormone after peperty in human males.

(131) (B). Along with pineal body, epithalanus function as an endocrine gland and secretes two hormone.
Serotonin and Melatenin.

(132) (B). Uric acid deposition between joint causes gout arthritis.

(133) (A). RBC is transported by blood.

(134) (A). Scala vestibuli and scala tymponi has perilymph whereas scala media has endolymph.

(135) (D). Renin is produced by JGA cells which regulates the function of kindey.

(136) (D). AuF is responsible for regulating the blood pressure.

(137) (B). Hypothalamus as link between Nervous & *Encocrine*. Its party nerves & party coark by releasing hormones.

(138) (D).

(139) (D).

(140) (C). Haemoglobin - transport of oxygen in blood.

(141) (B). Pepsin breaks proteins into proteoses and peptones, while trypsin breaks peptones into dipeptides.
Ptylin acts on polysaccharides and dipeptidase breaks dipeptiddes into amino acids.

(142) (C). Corpus luteum secretes progesterone which maintains endometrial lining of uterus,Pineal gland secretes melatonin which controls diurnal rhythm, Vasopressin is secreted by Hypothalamus and controls urine formation.

(143) (C). Structural unit of bone is Osteon (Haversian System).

(144) (D). Stato-acoustic receptor present in internal ear and helps in hearing and equilibrium.

(145) (B). Salivary amylase shows maximum digestion action at pH 6.8.

(146) (A). The central hollow portion of the vertebrae is called as Vertebral Canal or Neural Canal.

(147) (C). The depolarisation of nerve membrane takes place through influx of SODIUM ions, whereas reploarisation takes place due to efflux of POTASSIUM ions.

(148) (A). Schwann cells surrounds axons of myelinated nerve fibres, and forms myelin sheath.

(149) (C). Henle's loop- Does not reabsorb glucose.
Podocytes- lines the visceral layer of Bowmann's capsule.
JGA- Release renin due to low glomerular blood pressure.

(150) (B). Melatonin Secreted by pineal gland cotrols diurnal rhythms (Sleep and wake cycle).

(151) (B). AV node (pace setter) is located in the lower left corner of the right atrium.
SA node (pace maker) is located in the upper right corner of the right atrium near the opening of SVC.

(152) (B).

(153) (D). Thymus is known as primary lymphoid organ.

(154) (C). Synapse is the microscopic gap between axon and dendrites of two different neurons.

(155) (A). Kidney secretes erythropoietin which stimulates erythropoiesis.

(156) (B). The wall of urinary bladder shows thick layer of smooth muscle called DETRUSSOR.
Dartos is present in scrotal wall.
Deltoid is present in arm.

(157) (A). Epiglottis is the flap like structure made up of elastic cartilage guards the glottis and prevents entry of food particles in respiratory passage.

(158) (C). 1-7 pairs are vertebra sternal ribs.
8-10 pairs are vertebra-chondral ribs.
11-12 pairs are vertebral or floating ribs.

(159) (B). Pneumotaxic centre is located in pons varolli.

(160) (A). Maximum gaseous exchange between blood (dissolved phase) and alveolar (lungs) air (gaseous phase) across respiratory membrane occurs by **simple diffusion.** The exchange depends upon the concentration gradients (partial pressure) of the concerned gases in blood and alveolar air. Both O_2 and CO_2 are highly and equally soluble in lipid and hence, easily diffusible through cell membrane.
In **passive transport** an ion or molecule crossing a membrane moves down its concentration gradient and no metabolic energy is consumed. Facilitated diffusion is special type of passive transport where specffic permeases in membane facilitate the crossing of solutes.
Active transport uses specific transport protein called pumps, whkh use metabolic energy (ATP) to move ions or molecule against their concentration gradient.

(161) (D). Vasopressin (Antidiuretic Hormone-ADH) is a peptide hormone secreted by the posterior lobe of pituitary. It increases ue reabsorption of water in the distal convoluted tubule, collecting tubule and collecting ducts of nephrons of the kidney. The involuntary muscles in the walls of the intestine, gall bladder, urinary bladder and blood vessels are stimulated to contract by vasopressin.

(162) (A). The breathing movement in teleost fish occurs in two steps in which the gill chambers working as suction pumps. The blood in the blood capillaries of the gill lamillae flows in a direction opposite to the flow of water over the surface of lamellae, this system is called **counter current system**. As fresh respiratory water passes over gill filament, their body gives up CO_2 and absorbs O_2 from water.
Facilitated diffusion is a special type of passive transport, in which ions or molecules cross the membrane rapidly because specific permeases in the membrane facilitate their crossing.

(163) (C). The oxygen-haemoglobin dissociation curve under normal conditions is sigmoid shaped. The lower part of the curve indicates dissociation of oxygen from haemoglobin, whereas the upper part indicates the acceptance of oxygen by haemoglobin.
The shifting of oxygen-haemoglobin dissociation curve to the right by carbon dioxide partial pressure increasing is known as Bohr effect.

(164) (A). Muscle tension is the force produced by a whole muscle when it contracts. When the length of muscle fibre during contraction remain the same and the tension is increased, it is termed as isometric contraction. When during contraction the tension remains the same but the change occurs in length of muscle fibre, it is called isotonic contraction.
Refractory period is the period during, which a repolarised membrane become polarised.

(165) (D). White blood corpuscles or leucocytes are colour less, nucleated and motile cells of blood. These are categorised into two groups
(a) **Granulocytes** Eosinophils, basophils and neutrophils.
(b) **Agranulocytes** Lymphocytes and monocytes. The monocytes comprise only about 2-7% of leucocytes, but are the largest cells of the blood. After entering into tissue fluid these transform into macrophages for phagocytising invading microbes.

(166) (D). A gland is such a cell, tissue or organ, which synthesize and secrete some compound. These are of three categories
(a) **Endocrine glands** Thyroid, parathryoid, adrenal, pituitary, etc.
(b) **Mixed glands** Pancreas.
(c) **Exocrine glands** These remain connected by their ducts to the epithelia. Their secretions are carried by their ducts and poured on the surface of concerned epithelia. These glands are called duct glands, e.g., salivary, digestive, sweat and sebaceous glands.

(167) (B). Kidney is a compact mass of extremely fine and coiled tube-like excretory tubules called uriniferous tubules or nephrons. Each uriniferous, tubule or nephron begins with Bowman's capsule, which contains a network of blood capillaries, the glomerulus connected with efferent arteriole on one side and efferent arteriole on the other. The Bowman's capsule is followed by a short and narrow **neck** part of nephron marked by ciliated cells in its epithelium. The rest of the nephron is called secretory tubule, which is differentiated into proximal convoluted tubule, loop of Henle & distal convoluted tubule.

Neuron is structural and functional unit of nervous system.

(168) (D).

(169) (B). Aldosterone is a hormone produced by the adrenal glands. It controls excretion of sodium by the kidneys and thereby maintains the balance of salt and water in the body fluids.

(170) (B). Ptyalin is present in mammalian saliva for the initial stages of starch digestion.

Pepsin is an enzyme in the stomach that begins the digestion of proteins by splitting them into smaller pieces. Carboxypeptidase is a protease enzyme that hydrolyses the peptide bond of an amino acid residue at the carboxy-terminal (c-terminal) end. Dipeptidase is secreted by enterocytes into the small intestine.

(171) (B). In the given diagram, at (ii), hydrolysis of ATP occur, while (iii) represents power stroke. A never impulse reaches the muscle fibre, releasing calcium ions. This reveals myosin binding sites in the actin myofilament. The myosin heads use the energy gained from ATP hydrolysis to move towards the binding sites.

As the myosin leads bind to the actin myofilament they till, pulling the actin myofilament past them. As the actin filament moves, the myosin heads detach and reattach to the next binding site along.

(172) (A). Unloading of oxygen or dissociation of oxyhaemoglobin is enhanced with increase in pH, decrease in CO_2 and decrease in temperature in lungs and higher temperature in tissues. Haemoglobin, the oxygen carrier respiratory pigment present in RBC is conjugated protein. Which is made up of a protein **globin** and a non protein group **haeme** which is Iron porphyrin complex. Mamalian haemoglobn molecule is complex of 4 molecule of Fe^{2+} and 4 molecule of globin. Oxyhaemoglobin is formed by combination of oxygen and haemoglobin in blood.

$$Hb_4 + 4O_2 \xrightarrow[\text{tissue}]{\text{lung}} Hb_4O_8 \text{ (oxyhaemoglobin)}$$

Above reaction is reversible, because at the site of diffusion (tissues) oxyhaemoglobin release oxygen from the blood to tissue in the same way as the rapid absorption by the blood during its passage through lungs. $Hb_4O_8 \longrightarrow Hb_4 \text{ (Haemoglobin)} + 4O_2$

This reduced haemoglobin is again transported via blood to lungs and the cycle is again repeated.

This unloading of oxygen from oxyhaemoglobin as enhanced by, **higher pH of blood** (7.4), partial pressure of O_2 (40 mmHg) and CO_2 (46 mmHg) and low temperature in lungs and higher temperature in diffusing sites, i.e., tissues.

(173) (D). In ECG a prolonged PR interval indicates coronary artery disease (CAD) or atherosclerosis, i.e., formation of plaque and calcification in tunica interna and smooth muscle of medium sized and large arteries, and rheumatic fever. Enlargement of P wave indicate the enlargement of artia. PR interval is also called as PQ interval is time required for an impulse to travel through atria and AV node to the remaining conducting tissues. Normal PR interval is < 0.12 to 0.2 s, while normal QRS complex duration is < 0.10. Normal QT interval is < 0.42s.

(174) (B). Bile secreted by liver is an alkaline, yellowish green, juice which has no enzyme. It is formed of water, sodium bicarbonates, bile pigments (bilirubin and biliverdin) and two bile salts (sodium glycocholates and sodium taurocholate). Fats are finaly emulsified in small intestine by action of bile salts.

(175) (C). Pancreas is a heterocrine gland ie, partly endocrine and partly exocrine. The endocrine part is formed of islets of Langerhans. Islet of Langerharas are composed of three types of cells—

Alpha cells: Secrete glucagon hormone.

Beta cells : Secrete insulin hormones.

Gamma cells : precursors of alpha and beta cells.

(176) (D). The reduction in force of contraction of a muscle after prolonged stimulation is called muscle fatigue. The accumulation of lactic acid leads to muscle fatigue. Lactic acid is produced by glycolysis in absence of O_2.

(177) (D). The oxygenated and deoxygenated blood are forced into their respective ventricles through atrioventricular opening by the contraction of atria. The contraction of atria is initiated and activated by the sinoatrial node (SA node) commonly called pacemaker. It spreads waves of contraction across the walls of atria via muscle fibres at regular intervals.

(178) (B). Vitamin-K or phylloquinone is essential for normal functioning of liver, clotting of blood and preventing haemorrhage. Haemorrhage is characterized by deficiency of prothrombin in blood and also deficiency of factor VII, IX & X which are essential for blood coagulation.

(179) (C). From the distal convoluted tubule the filtrate enters the collecting tubule where further reabsorption of water lakes place. Now the filtration become more concentrated which makes the filtrate hypertonic. When the collecting duct become less permeable to water it produces more dilute urine.

(180) (C). Pituitary gland is smallest endocrine gland. It has three distinct parts (i) the anterior lobe (ii) the middle lobe (iii) the posterior lobe. Each secreted a number of hormones.