Rao IIT Academy
Symbol of Excellence and Perfection
JEE | MEDICAL-UG | BOARDS | KVPY | NTSE | OLYMPIADS

Target Med-2018

Medical-UG / Target - 2018 / NEET
Official Test Paper
Code - FF / Solutions

Date: 06 May 2018

1.

Difficulty : Easy

Topics :

Coordination Compounds,

$[Ni(CO)_4]$ Ni charge is zero (Z = 28)

$Ni \xrightarrow[G.S.]{} [Ar]4s^2 3d^8$ (CO is a strong ligand so 4s electrons are moved to 3d)

$\xrightarrow[(E,S.)]{} [Ar]4s^0 3d^{10}$

$\therefore$ Hybridisation = sp^3 and zero unpaired electrons $\therefore$ diamagnetic.

2.

Difficulty : Medium

Topics :

Coordination Compounds,

$Fe(CO)_5$ i.e. penta carbonyl iron(O) has mononuclear form as its EAN value is equal to 36 i.e. noble gas configuration.

$$
\begin{array}{c}
\overset{+}{O} \\
\| \\
\overset{-}{C} \\
| \\
{}^{+}O \equiv C^{-} \cdots \underset{|}{Fe} \overset{C^{-} \equiv O^{+}}{\underset{C^{-} \equiv O^{+}}{<}} \\
\overset{-}{C} \\
\| \\
\overset{+}{O}
\end{array}
$$
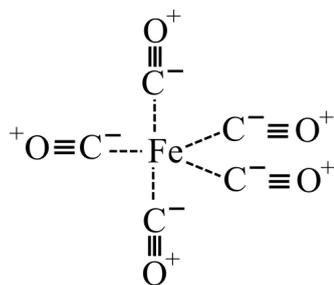
Effective atomic numbers

$(EAN) = Z - (O.S.) + 5 \times 2 = 26 + 10 = 36$

3.

Difficulty : Medium

Topics :

Coordination Compounds,

	Electronic configuration	Oxidation state	Structure
(i) $\underline{Cr}^{+6}O_4^{2-}$	d^0	+6	
(ii) $\underline{Cr}_2^{+6}O_7^{2-}$	d^0	+6	
(iii) $\underline{Mn}^{+7}O_4^-$	d^0	+7	
(iv) $\underline{Mn}^{+6}O_4^{2-}$	d^1	+6	

4.

Difficulty : Easy

Topics :

Coordination Compounds,

$\left[CoCl_2(en)_2\right]$ complex shows cis-trans isomerism.

i.e. dichlorobis (ethylenediamine) cobalt (II)

Cis-form | Trans-form

5.
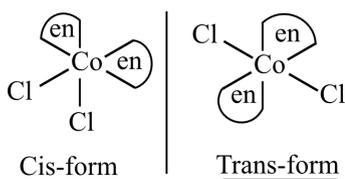
Difficulty : Medium

Topics :

d-block,

IONS	e^-conf.	Magnetic Moment	$\mu = \sqrt{n(n+2)}B.M.$
1. Co^{+3}	$3d^6$	$\sqrt{24}$	$a \rightarrow (iv)$
2. Cr^{+3}	$3d^3$	$\sqrt{15}$	$b \rightarrow (v)$
3. Fe^{+3}	$3d^5$	$\sqrt{35}$	$c \rightarrow (ii)$
4. Ni^{+2}	$3d^8$	$\sqrt{8}$	$d \rightarrow (i)$

6.

Difficulty : Medium

Topics :

P-block-I,

Boron can show maximum covalent of 4, hence BF_6^{3-} is not possible.

7.

Difficulty : Easy

Topics :

P-block-II,

Compounds	Oxidation Number of N
1. $H\underline{N}O_3$	+5
2. $\underline{N}O$	+2
3. $\underline{N}_2$	0
4. $\underline{N}H_4Cl$	-3

8.

Difficulty : Medium

Topics :

Metallurgy,

Magnesium is most electropositive element among the options given as per the ΔG^o values of MgO and Al_2O_3 oxides in Ellingham diagram.

$$3Mg + Al_2O_3 \longrightarrow 2Al + 3MgO$$

9.

Difficulty : Medium

Topics :

P-block,

Among Halogens, fluorine is most electronegative & hence cannot show positive oxidation state. Cl, Br, I can show positive oxidation states.

10.

Difficulty : Easy

Topics :

Chemical Bonding,

LP $\equiv$ Lone Pair

BP $\equiv$ Bond pair

As per VSEPR theory ClF_3 has $2LP + 3BP$.
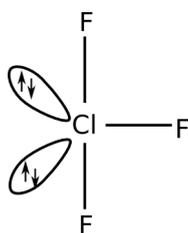
T-Shaped Structure

11.

Difficulty : Easy

Topics :

P-block,

Due to poor screening effect of $4f$ and $3d$ electrons:

(i) Size of Ga is less than Al

Hence the overall order is : $B < Ga < Al < In < Tl$

12.

Difficulty : Medium

Topics :

GOC,

In strong acidic medium aniline becomes anilinium, so meta nitration takes place.
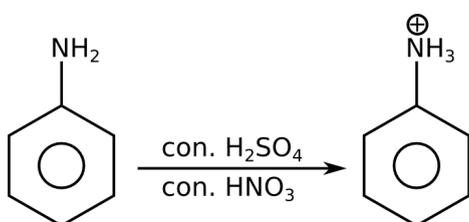
13.

Difficulty : Difficult

Topics :

Polymers,

Melamine is monomer of condensation polymer.

14.

Difficulty : Medium

Topics :

BIOMOLECULES ,

Amylose contains only $1, 4$ α-linkage but Amylopectin contains both $1, 4$ & $1, 6$ - α-linkage

15.

Difficulty : Difficult

Topics :

Mole concept,

$$HCOOH \underset{0.05}{\xrightarrow{H_2SO_4}} \underset{0.05}{H_2O} + \underset{0.05}{CO}$$

$$H_2C_2O_4 \underset{0.05}{\xrightarrow{H_2SO_4}} \underset{0.05}{H_2O} + \underset{0.05}{CO} + \underset{0.05}{CO_2}$$
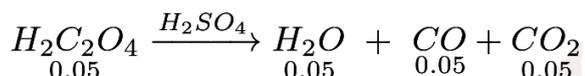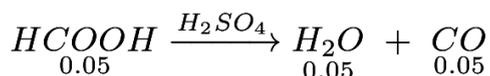
Total moles of $CO = 0.05 + 0.05 = 0.10$

KOH absorbs $CO_2(g)$

$\therefore$ Mass of $CO = 0.1 \times 28 = 2.8g$

16.

Difficulty : Easy

Topics :

S-block,

Beryllium is most electronegative i.e. BeO is amphoteric oxide.

17.

Difficulty : Medium

Topics :

Alcohols,

$$I_2 + NaOH \longrightarrow NaOI$$

formation of yellow ppt represents iodoform test.

$\therefore$
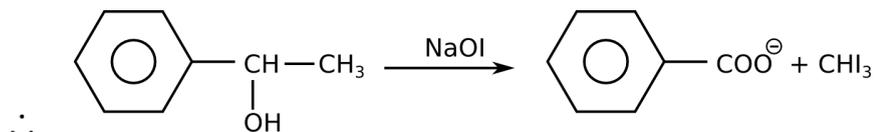
18.

Difficulty : Easy

Topics :

Phenols,

$$CHCl_3 + NaOH \longrightarrow\ : CCl_2 \text{ dichlorocarbene}$$
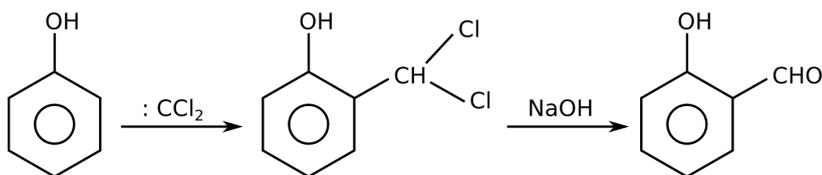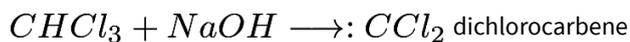
Given reactions is Reimer-Tiemann reaction.

19.

Difficulty : Medium

Topics :

CARBOXYLIC ACIDS AND ITS DERIVATIVES,

$$\overset{O}{\underset{R - C - OH}{\|}}$$ have much stronger intermolecular hydrogen bonding than alcohols.

 (The +ve charge on oxygen creates much stronger δ^+ on hydrogen)
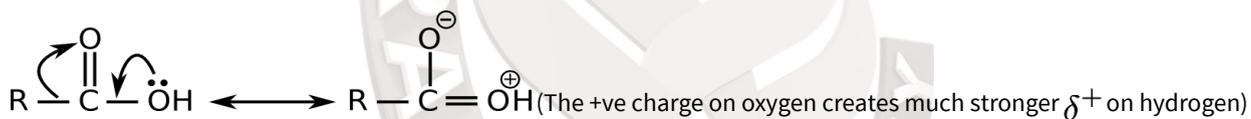
20.

Difficulty : Easy

Topics :

GOC,

$$CH_2 = CH - C \equiv C - H$$
$$sp^2 \quad\ \ sp^2 \quad\ sp \quad sp$$

21.
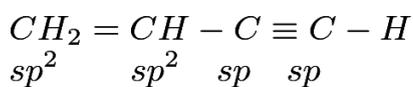
Difficulty : Medium

Topics :

Aromatic compounds,
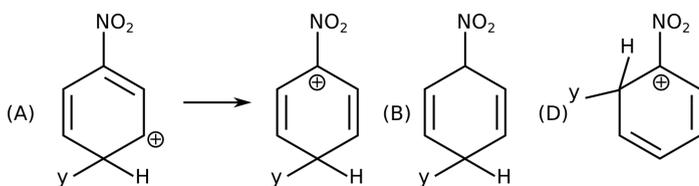
are destabilized by $-NO_2$ withdrawing effect
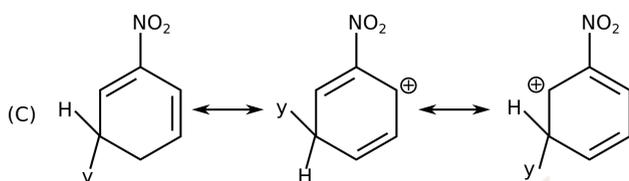
22.

Difficulty : Easy

Topics :

GOC,

Strength of $-I \alpha$ Electronegativity

$$\therefore -F > -OR > -NR_2$$

23.

Difficulty : Difficult

Topics :

P-block-II,

N_2O_5 is most acidic oxide which is ionic crystal. $NO_2^+ NO_3^-$ nitronium nitrate.

24.

Difficulty : Medium

Topics :

Alkyl halides,

25.
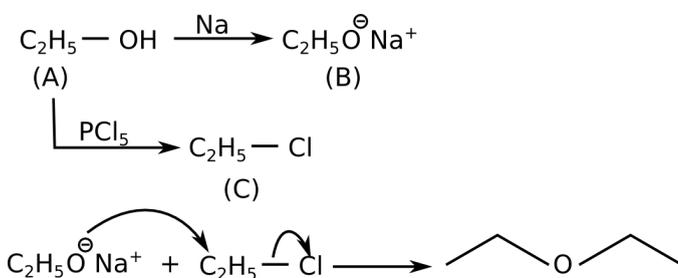
Difficulty : Medium

Topics :

Aryl halide,
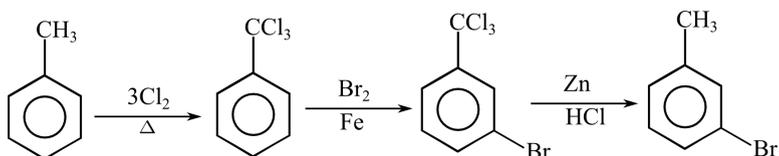
26.

Difficulty : Easy

Topics :

Hydrocarbon,

$$CH_4 \xrightarrow[hv]{Br_2} CH_3 - Br \xrightarrow[ether]{Na} \underset{less\ than\ 4C-atoms\ alkanes}{CH_3 - CH_3}$$

$$CH_3 - CH_3 \xrightarrow[hv]{Br_2} CH_3 - CH_2 - Br \xrightarrow[ether]{Na} C_2H_5 - C_2H_5$$

27.
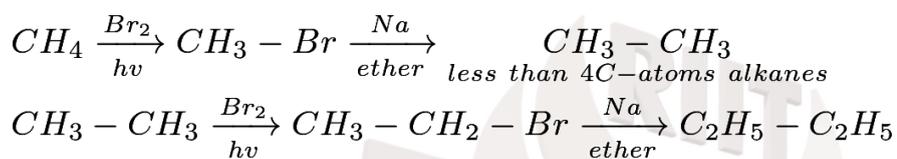
Difficulty : Medium

Topics :

Phenols,
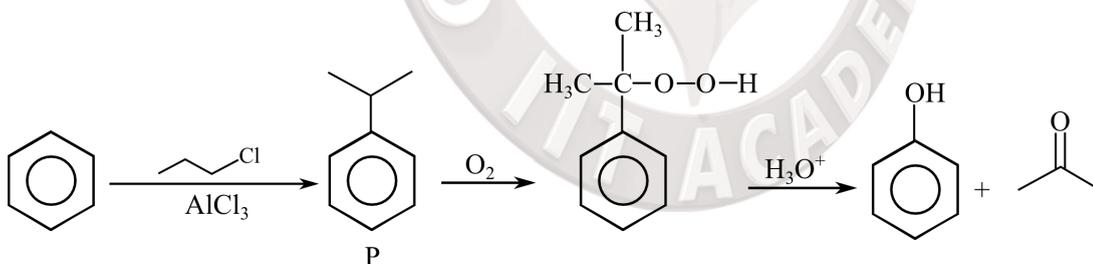
Cumene-Hydroperoxide rearrangement.

28.

Difficulty : Easy

Topics :

BIOMOLECULES ,

Only α — amino acids form Zwitterion
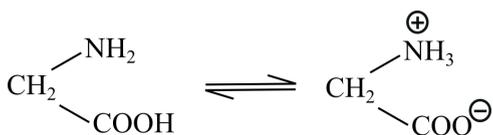
Glycine

29.

Difficulty : Medium

Topics :

Mole concept,

$$2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \longrightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$$
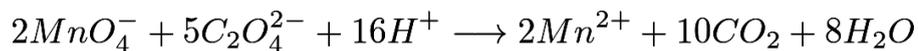
30.

Difficulty : Medium

Topics :

equilibrium,

$\because$ forward reaction is exothermic and favours at low temperature

$$\Delta n < 0$$

High pressure favours

31.

Difficulty : Easy

Topics :

Chemical Kinetics,

$$t_{\frac{1}{2}} \propto \frac{1}{a^{n-1}}$$

$\therefore$ for zero order

$$t_{\frac{1}{2}} \propto \ 'a'$$

32.

Difficulty : Medium

Topics :

Thermodynamics,

$$\frac{1}{2}X_2 + \frac{1}{2}Y_2 \rightarrow XY$$
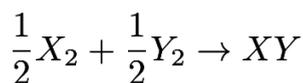
$$\therefore \Delta H = \frac{1}{2}[B.E_{X-X}] + \frac{1}{2}[B.E_{Y-Y}] - [B.E_{X-Y}]$$

$$-200 = \frac{1}{2}[a] + \frac{1}{2}\left[\frac{a}{2}\right] - [a]$$

$$\therefore a = 800$$

33.

Difficulty : Easy

Topics :

Gaseous State,

a is the vander waal's constant for forces of attraction between the gas molecules

34.

Difficulty : Easy

Topics :

Gaseous State,

Value of a $\propto$ Ease of liquifaction

35.

Difficulty : Medium

Topics :

Ionic equilibrium,

$$[H^+] = \frac{N_a V_a - N_b V_b}{V_a + V_b}$$

$$= \frac{15 - 5}{100} = 0.1$$

$$\therefore pH = -\log_{10}[H^+] = 1$$

36.

Difficulty : Medium

Topics :

Ionic equilibrium,

$$\text{Solubility } S = \frac{2.42 \times 10^{-3}}{233} = 1.04 \times 10^{-5}$$

$$\therefore K_{sp} = [Ba^{+2}][SO_4^{2-}]$$

$$= S^2$$

$$= (1.04 \times 10^{-5})^2$$

$$= 1.0816 \times 10^{-10}$$

37.

Difficulty : Easy

Topics :

Surface Chemistry,

According to Hardy-Schulze law coagulating power depends on magnitude of the charge and sign on the ion.

38.

Difficulty : Medium

Topics :

Kinetic energy,

(1) Rate of reaction decrease with decrease in concentration of reactant for any order reaction [other than zero order]

(2) $t_{\frac{1}{2}} = \dfrac{0.693}{K}$ [for first order]

Independent on initial concentration

39.

Difficulty : Medium

Topics :

Electrochemistry,

$$H\overset{+}{Br}O \rightarrow \overset{0}{Br_2} \qquad E^\circ = 1.595$$
$$H\overset{+}{Br}O \rightarrow \overset{+5}{BrO_3^-} \qquad E^\circ = -1.5V$$
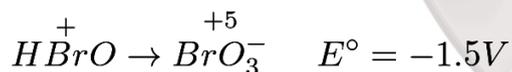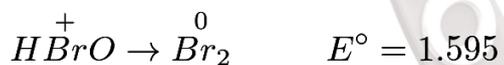
$\because E^\circ$ is +ve for overall reaction as per Gibb's energy change of reaction :

$$2HBrO \rightarrow Br_2 + BrO_3^-$$

$HBrO$ undergoes disproportionation.

40.

Difficulty : Easy

Topics :

Ionic equilibrium,

(1) Density of H_2O is $1g/mL$

$\therefore 18mL \rightarrow 18g$ of H_2O

$\therefore$ 1Mole of $H_2O \rightarrow N_A$ Molecules

(2) $0.18g$ of $H_2O \rightarrow 0.01$ moles

$\downarrow$

$0.01 \times N_A$

(3) 10^{-4}moles $\rightarrow 10^{-4} \times N_A$

(4) 10^{-3}moles $\rightarrow 10^{-3} \times N_A$

41.

Difficulty : Easy

Topics :

S-block,

Ionic character as per Fajan rule depends on the ionic radius of the s-block cation.

$Be^{+2} < Ca^{+2} < Ba^{+2}$ Ionic Radius

42.

Difficulty : Easy

Topics :

S-block,

Mg has valency 2 but element X has valency 3 as per electronic configuration, hence formula is Mg_3X_2.

43.
Difficulty : Difficult

Topics :

Solid State,

$$P = \frac{Z \times M}{N_0 \times a^3}$$

for $Bcc \rightarrow Z = 2$

$$a = \frac{4r}{\sqrt{3}}$$

for $fcc \rightarrow Z = 4$

$$a = \frac{4r}{\sqrt{2}}$$

$$\therefore \frac{P_{Bcc}}{P_{fcc}} = \frac{\frac{2}{\left(\frac{4r}{\sqrt{3}}\right)^3}}{\frac{4}{\left(\frac{4r}{\sqrt{2}}\right)^3}}$$

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

44.
Difficulty : Easy

Topics :

Chemical Bonding,

Species	Total electrons	Bond order
NO	15	2.5
CN^-	14	3.0 Highest
CN^+	12	2.0
CN	13	2.5

45.
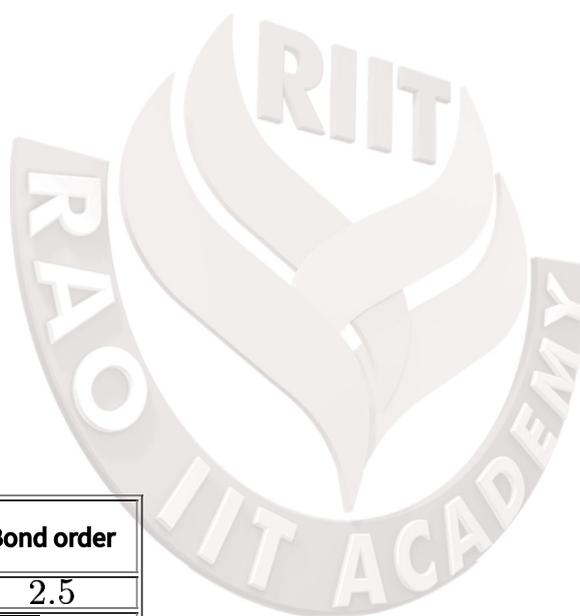
Difficulty : Easy

Topics :

Atomic Structure,

(1) Orbital angular momentum $= \sqrt{l(l+1)} \cdot \dfrac{h}{2\pi}$

for $'s'$ orbital $l = 0$

$\therefore$ Orbital angular momentum is zero

(2) Orbital designated by $\rightarrow n, l \text{ and } m$

Electron designated by $\rightarrow n, l, m \text{ and } s$

(3) for N

$$1s^2 \qquad 2s^2 \qquad 2p^3$$

$$\boxed{\uparrow\downarrow} \qquad \boxed{\uparrow\downarrow} \qquad \boxed{\uparrow}\boxed{\uparrow}\boxed{\uparrow}$$
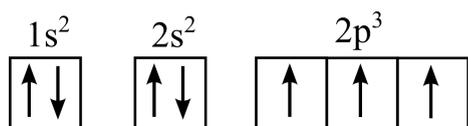
(4) By convention

for $d_z2 \rightarrow m = 0$

46.

Difficulty : Easy

Topics :

Zoology,
HUMAN REPRODUCTION,

NCERT - XII - Page No. 53

hCG—human chorionic gonadotropin

hPL—human placental lactogen

Progesterone and estrogen

47.

Difficulty : Easy

Topics :

Biology,
REPRODUCTIVE HEALTH,

Refer_NCERT - XII - Page No. 61

The contraceptive 'SAHELI' blocks estrogen receptors in the uterus, preventing eggs from getting implanted.

48.

Difficulty : Medium

Topics :

Biology,
HUMAN REPRODUCTION,

In spermiogenesis spermatozoa are formed, while in spermiation spermatozoa are released from sertoli cells into the cavity of seminiferous tubules.

49.

Difficulty : Difficult

Topics :

Biology,
HUMAN REPRODUCTION,

The amnion is formed from the embryo and consists of outer mesoderm & inner ectoderm.

50.

Difficulty : Easy

Topics :

Organism and Its Environment,
Botany,

For growing / expanding population, the pre-reproductive individuals are more than reproductive individuals.

51.

Difficulty : Medium

Topics :

Botany,
BIODIVERSITY AND CONSERVATION ,

Sacred grooves are a part of in situ conservation.

52.

Difficulty : Easy

Topics :

ECOSYSTEM,
Botany,

Amensalism is where one organism is neutral and other is affected. Antibiotic produced by one organism (neutral) harms / kills the other organism.

53.

Difficulty : Easy

Topics :

Zoology,
Health and Disease,

NCERT - XIIth Page No. 158, 159

The drug 'smack' is obtain from latex of the poppy plant - *Papaver somniferum*.

54.

Difficulty : Easy

Topics :

Botany,
ENVIRONMENTAL ISSUES ,

From table (conceptual)

55.

Difficulty : Medium

Topics :

Zoology,
Digestion and Absorption,

NCERT - XIth Page No. 62

Parietal / oxyntic cells which secretes HCl and intrinsic factor helps in the absorption of vitamin B_{12}, which helps in maturation of RBCs thus helps in erythropoesis.

56.

Difficulty : Easy

Topics :

Zoology,
BODY FLUIDS and Circulation,

	Column-I		Column-II
a	Fibrinogen	ii	Blood clotting
b	Globulin	iii	Defence mechanism
c	Albumin	i	Osomotic balance

57.

Difficulty : Easy

Topics :

Zoology,
LOCOMOTION,
Types of Movement,

Calcium is important in skeletal muscle contraction, because it binds to troponin to remove the masking of active sites on action for myosin.

58.

Difficulty : Easy

Topics :

Zoology,
Breathing and Exchange of Gases,

Silicosis is an occupational respiratory disorder.

Anthracis is a bacterial disease caused by *Bacillus anthracis*.

Botulism is bacterial disease caused by *Clostridium botulinum*.

Emphysema is caused by cigarette smoking.

59.

Difficulty : Medium

Topics :

Botany,
Biodiversity,

Paramoecium [Ciliates] has macronucleus to control the activity of cell and micronucleus to control reproduction

60.

Difficulty : Easy

Topics :

Zoology,
Structural Organisation in Animals,

NCERT XI, Page No. 114

Male cockroaches have caudal style / Anal style. Whereas female cockroaches do not.

61.

Difficulty : Easy

Topics :

Botany,
Biodiversity,

Diatom are major photosynthetic protists and so called producers of ocean

62.

Difficulty : Medium

Topics :

Zoology,
Animal Kingdom,

NCERT - XIth Page No. 58

The digestive tract of birds has additional chambers, the Crop and Gizzard.

63.

Difficulty : Difficult

Topics :

Zoology,
Structural Organisation in Animals,

NCERT - XIth page No. 110

The development of earthworm is direct, i.e. there is no larva formed.

Hence, no metamosphosis.

64.

Difficulty : Easy

Topics :

Zoology,
Animal Kingdom,

NCERT - XIth Page No. 58

Chelone (turtle) belongs to Class Reptilia is a poikilotherm.

Macropus - Kangaroo, *Camelus* - Camel, *Psittacula* - Parrot are homeotherms.

65.

Difficulty : Easy

Topics :

Zoology,
EVOLUTION,

Homologous organs have similar structure and perform different functions.

Eg. Forelimbs of man, cheetah, whale and bat.

66.

Difficulty : Easy

Topics :

Zoology,
Health and Disease,

Wuchereria bancrofti and wuchereria malayi, the filarial worms cause a slowly developing chronic inflammation of the organs in which they live for many years, usually the lymphatic vessels of the lower limbs and the disease is called elephantiasis / filariars.

67.

Difficulty : Medium

Topics :

Botany,
MICROBES IN HUMAN WELFARE ,

Conversion of milk into curd increase the amount of vitamin B_{12} in curd.

68.

Difficulty : Difficult

Topics :

Zoology,
Principles of Inheritance and Variation,

Geneo type	Blood group	Reason
$I^A i$	A	I^A is dominant over i - Dominance
$I^B i$	B	I^B is dominant over i - Dominance
$I^A I^B$	AB	$I^A \& I^B$ are expressing equally - Co-dominance
$I^A, I^B \& i-$	-	Multiple Alleles

69.

Difficulty : Difficult

Topics :

Zoology,
Health and Disease,

Psoriasis, Rheumatoid arthritis, Vitiligo are autoimmune diseases whereas Alzheimer's disease is not.

Alzheimer's disease is a chronic neurodegenerative disease caused by the accumulation of extra cellular amyloid β proteins.

70.

Difficulty : Difficult

Topics :

Zoology,
EVOLUTION,

Eye of octopus, bat and man performs similar function (vision) but are structurally different, a characteristics of convergent evolution and not divergent evolution.

71.

Difficulty : Easy

Topics :

Zoology,
EXCRETORY PRODUCTS THEIR ELIMINATION,

Glycosuria - Presence of glucose in urine

Gout - Accumulation of uric acid in joints

Renal calculi - Mass of crystallised salts within the kidney

Glomerular nephritis - Inflammation in glomeruli
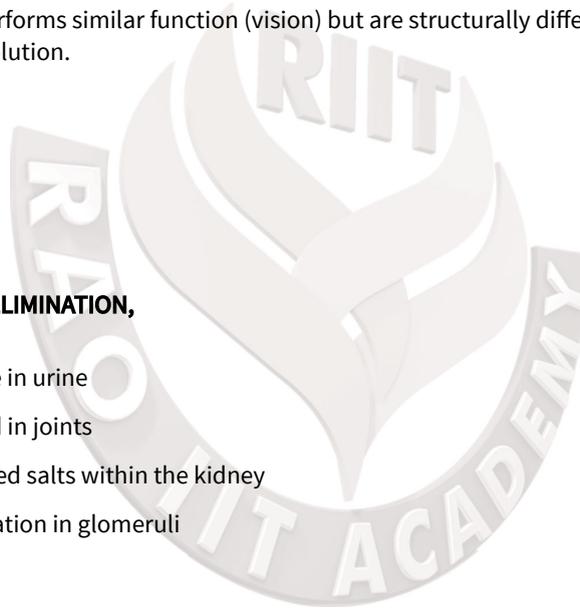
72.

Difficulty : Easy

Topics :

Zoology,
EXCRETORY PRODUCTS THEIR ELIMINATION,

a - iv, b - i, c - ii, d - iii

Column I		Column II	
(Function)		(Part of Excretory System)	
a.	Ultrafiltration	iv.	Malphighian corpuscle
b.	Concentration of urine	i.	Henle's loop
c.	Transport of urine	ii.	Ureter
d.	Storage of urine	iii.	Urinary bladder

73.

Difficulty : Medium

Topics :

Zoology,
NEURAL CONTROL and COORDINATION ,

Nissl's bodies are mainly composed of free ribosomes and RER.

74.

Difficulty : Easy

Topics :

Zoology,
Digestion and Absorption,

NCERT - XIth - Page No. 257, 258

Human dentition is described as

Thecodont - each tooth is embedded in a socket of jaw bone.

Diphyodont - human being forms two sets of teeth during their life, a set of temporary milk of deciduous teeth replaced by a set of permanent or adult teeth.

Heterodont - four different types of teeth namely : incisors, canine, premolars and molars.

75.

Difficulty : Easy

Topics :

Botany,
MOLECULAR BASIS OF INHERITANCE ,

Many ribosomes on same mRNA is called polyribosome / Polysome

76.

Difficulty : Easy

Topics :

Botany,

Topic - Respiration in plants

Oxidative phosphorylation / ETS takes place on inner mitochondrial membrane

77.

Difficulty : Difficult

Topics :

Botany,
Cell: The Unit of Life ,

Lipid formation takes place in SER

78.

Difficulty : Easy

Topics :

Principles of Inheritance and Variation,
Botany,

Polytene chromosomes are interphase chromosome found in salivary glands of diptera insect

79.

Difficulty : Easy

Topics :

Botany,
MOLECULAR BASIS OF INHERITANCE ,

Operator, structural gene and promoter gene are part of operon.

80.

Difficulty : Easy

Topics :

Zoology,
Principles of Inheritance and Variation,

X-chromosome can be inherited from mother by both son as well as daughter. Thus a woman who has an X-linked condition on one of her X chromosome can be inherited both sons and daughters.

81.

Difficulty : Easy

Topics :

Zoology,
HUMAN REPRODUCTION,

NCERT - XIIth - Page No. 49, 50

Column - I		Column - II	
a.	Proliferative Phase	ii.	Follicular Phase
b.	Secretory Phase	iii.	Luteal Phase
c.	Menstruation	i.	Breakdown of endometrial lining

82.

Difficulty : Easy

Topics :

Zoology,
Principles of Inheritance and Variation,

NCERT - XIIth - Page No. 135

According to Hugo de Vries, tho mechanism of evolution is due to mutation leading to speciation and hence called it saltation (single step large mutation).

83.

Difficulty : Easy

Topics :

Botany,
MOLECULAR BASIS OF INHERITANCE ,

Non coding strand is the template for mRNA synthesis and so sequence of coding strand would be same as mRNA except having uracil in place of thymine.

84.

Difficulty : Medium

Topics :

Zoology,
CHEMICAL COORDINATION AND INTEGRATION,

NCERT - XIth - Page No. 335

Epinephrine is the hormone of adrenal medulla, is a amino acid derivative; commonly called as catecholamine.

Ecdysone, Estradiol, Estriol are steroid hormones.

85.

Difficulty : Medium

Topics :

Zoology,
NEURAL CONTROL and COORDINATION ,

NCERT - XIth - Page No. 321

Limbic system or limbic lobe is involved in the regulation of sexual behaviour, expression of emotional reactions (e.g., excitement, pleasure, rage and fear), and motivation.

86.

Difficulty : Easy

Topics :

Zoology,
CHEMICAL COORDINATION AND INTEGRATION,

Parathyroid hormone (PTH) increases the Ca^{2+} levels in the blood. PTH acts on bones and stimulates the process of bone resorption stimulates reabsorption of Ca^{2+} by the renal tubules and increases Ca^{2+} absorption from the digested food & away with calcitonin helps maintain calcium balance in body.

Estrogen other than being a female sex hormone, also helps in maintaining calcium balance in the body.

87.

Difficulty : Easy

Topics :

Zoology,
NEURAL CONTROL and COORDINATION ,

The eye ball contains a transparent crystalline lens which is held in place by ligaments attached to the ciliary body.

88.

Difficulty : Easy

Topics :

Zoology,
Breathing and Exchange of Gases,

Asthma is a difficulty in breathing causing wheezing due to inflammation of bronchi and bronchioles.

Emphysema is a chronic disorder in which alveolar walls are damaged due to which respiratory surface is decreased. One of the major causes of this is cigarette smoking.

89.

Difficulty : Easy

Topics :

Zoology,
BODY FLUIDS and Circulation,

NCERT - XIth - Page No. 283

Column I		Column II	
a.	Tricuspid valve	iii.	Between right atrium and right ventricle
b.	Bicuspid valve	i.	Between left atrium and left ventricle
c.	Semilunar valve	ii.	Between right ventricle and pulmonary artery

90.

Difficulty : Easy

Topics :

Zoology,
Breathing and Exchange of Gases,

NCERT - XIth - Page No. 271

Column I		Column II	
a.	Tidal volume	iii	500 — 550 mL
b.	Inspiratory Reserve	i	2500 — 3000 mL
c.	Expiratory Reserve volume	iv	1000 — 1100 mL
d.	Residual volume	ii	1100 — 1200 mL

91.
   Difficulty : Easy

   Topics :

   Anatomy of Flowering Plants ,

   Endodermis have casparian strip made up of suberin

92.
   Difficulty : Easy

   Topics :

   Kingdom Plantae,

   Grasses do not have cambium and so no secondary growth

93.
   Difficulty : Easy

   Topics :

   Botany,
   Morphology of Flowering Plants ,

   Pneumatophores are breathing roots found in mangroves which grow in saline areas {Halophytes}

94.
   Difficulty : Easy

   Topics :

   Botany,
   Morphology of Flowering Plants ,

   Potato is modified stem but sweet potato is tuberous adventitious root

95.
   Difficulty : Medium

   Topics :

   Botany,
   Anatomy of Flowering Plants ,

   Secondary xylem & phloem are produced by vascular cambium

96.

Difficulty : Easy

Topics :

Botany,
Kingdom Plantae,

Salvinia is heterosporous, Horsetails are pteridophyta stem is branched in Cedrus.

97.

Difficulty : Medium

Topics :

Botany,
Biodiversity,

Pseudopodia are found in *Sarcodines* (Amoeba).

98.

Difficulty : Medium

Topics :

Botany,
The Living World ,

a - iii, b - iv, c - i, d - ii

	Column I		Column II
a.	Herbarium	iii.	Is a place where dried and pressed plant specimens mounted on sheets are kept.
b.	Key	iv.	A booklet containing a list of characters and their alternates which are helpful in identification of various taxa.
c.	Museum	i.	It is a place having a collection of preserved plants and animals.
d	Catalogue	ii	A list that enumerates methodically all the species found in an area with brief description aiding identification.

99.

Difficulty : Easy

Topics :

Botany,
Kingdom Plantae,

Winged pollen grains are found in pine tree.

100.

Difficulty : Easy

Topics :

Botany,
Biodiversity,

Agaricus is basidiomycetes in which spores are formed exogenously.

101.

Difficulty : Medium

Topics :

Botany,
Kingdom Plantae,

Polysiphonia are red algae, in which are non-motile eggs are fertilized by non-motile sperm. Both male and female gametes are non motile.

102.

Difficulty : Medium

Topics :

Transport in Plants ,

Potassium is responsible for maintaining turgidity in cells. Influx of K^+ open the stomata and efflux of K^+ close the stomata.

103.

Difficulty : Easy

Topics :

PHOTOSYNTHESIS IN HIGHER PLANTS ,

Green sulphur bacteria releases Sulphur as the by product during photosynthesis.

104.

Difficulty : Easy

Topics :

Photosynthesis,

Double fertilization occurs in Angiosperm in which 1st male gamete fuses with egg which is known as syngamy. Whereas 2nd male gamete fuses with secondary nucleus to form PEN and the process is known as triple fusion or double fertilization.

105.

Difficulty : Easy

Topics :

REPRODUCTION IN PLANTS,

Tageticula moth cannot completes its life cycle without yucca plant and yucca plant has no other pollinator

106.

Difficulty : Easy

Topics :

REPRODUCTION IN PLANTS,

Pollen grains can be stored for several years in liquid nitrogen having a temperature of $-196^\circ C$, this is called cryo-preservation.

107.

Difficulty : Medium

Topics :

REPRODUCTION IN PLANTS,

NAD^+ functions as an electron carrier in ETS.

108.

Difficulty : Difficult

Topics :

MINERAL NUTRITION ,

Iron absorbed by plants in ferric ion form.
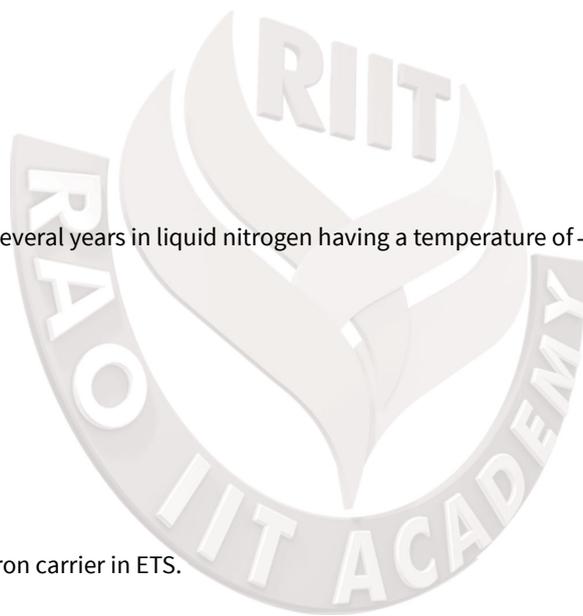
109.

Difficulty : Medium

Topics :

CELL CYCLE AND CELL DIVISION ,

Zygotene = Synapsis

Pachytene = Crossing-over

Diplotene = Separation of homologous chromosomes

Diakinesis = Terminalisation

110.

Difficulty : Medium

Topics :

Botany,
Cell: The Unit of Life ,

Nucleolus is a site for active ribosomal RNA synthesis.

111.

Difficulty : Medium

Topics :

Biology,
Cell: The Unit of Life ,

The function of Golgi complex is to secrete the proteins out of cell through secretory vesicles.

112.

Difficulty : Medium

Topics :

Botany,
PHOTOSYNTHESIS IN HIGHER PLANTS ,

Light reaction produces $ATP, NADPH \ and \ O_2$ where as $NADH$ is not produce in light reaction.

113.

Difficulty : Medium

Topics :

Botany,
Transport in Plants ,

O_2 conc. doesn't affect stomatal movement.

114.

Difficulty : Easy

Topics :

Botany,
Biodiversity,

Saccharomyces (yeast) is a unicellular fungus (Eukaryotic organism)

115.

Difficulty : Medium

Topics :

BIOMOLECULES ,

The two functional groups characterstic of sugar are carbonyl and hydroxyl group.

116.

Difficulty : Medium

Topics :

Anatomy of Flowering Plants ,

Monocot such as grasses, bamboo etc has dumb-bell shape guard cell whereas dicot has kidney shape guard cell.

117.

Difficulty : Medium

Topics :

MOLECULAR BASIS OF INHERITANCE ,

Jacob and Monod - Discovered Lac-Operon in *E. coli.*

118.

Difficulty : Medium

Topics :

MOLECULAR BASIS OF INHERITANCE ,

Semiconservative replication of DNA was first shown in E. coli bacteria.

119.

Difficulty : Medium

Topics :

Reproduction in Organisms ,

Offsets is a type of vegetative propagation produced by mitotic division.

120.

Difficulty : Medium

Topics :

Reproduction in Organisms ,

Bamboo species flowers only once in its life-time.

121.

Difficulty : Medium

Topics :

REPRODUCTION IN PLANTS,

Sporopollenin is the toughest polymer of carotenoid which prevent degradation of pollen grain as fossils.

122.

Difficulty : Medium

Topics :

Principles of Inheritance and Variation,

Starch synthesis in pea is an example of co-dominance.

123.

Difficulty : Medium

Topics :

Principles of Inheritance and Variation,

Punnett square was developed by British scientist. Reginald Punnet.

124.

Difficulty : Medium

Topics :

Biotechnology ,

The correct order in PCR are

(a) Denaturation   (b) Annealing   (c) Extension

125.

Difficulty : Medium

Topics :

BIOTECHNOLOGY AND ITS APPLICATIONS ,

GEAC is the organisation responsible for assessing the safety of introducing genetically modified organisms for public use.

126.

Difficulty : Medium

Topics :

Biotechnology ,

Retrovirus is commonly used as a vector for introducing a DNA fragment in human lymphocytes.

127.

Difficulty : Medium

Topics :

Biotechnology ,

Use of bioresources by multinational companies and organisations without authorisation from the concerned country and its people is called Biopirarcy

128.

Difficulty : Medium

Topics :

BIOTECHNOLOGY AND ITS APPLICATIONS ,

A 'new' variety of Basmati rice was patented by a foreign company in taxas called Texmati, through such varieties have been present in India for a long time.

129.

Difficulty : Medium

Topics :

MOLECULAR BASIS OF INHERITANCE ,

Ribozyme is an enzyme made up of RNA (Ribonucleic acid).

130.

Difficulty : Difficult

Topics :

Organism and Its Environment,

Niche is the functional role played by the organism where it lives.

131.

Difficulty : Medium

Topics :

ENVIRONMENTAL ISSUES ,

O_3 is a secondary pollutant, whereas rest are primary pollutant.

132.

Difficulty : Medium

Topics :

Organism and Its Environment,

Natality refers to birth rate in a given area.

133.

Difficulty : Medium

Topics :

Organism and Its Environment,

16th September is celebrated as world Ozone Day.

134.

Difficulty : Easy

Topics :

ECOSYSTEM,

| Secondary consumer = 120 g |
| Primary consumer = 60g |
| Producer = 10g |

The above ecological pyramid is inverted pyramid of biomass.

135.

Difficulty : Medium

Topics :

ENVIRONMENTAL ISSUES ,

Free Cl atom attacks the ozone molecule and breaks it.

$$O_3 + Cl \rightarrow ClO + O_2$$
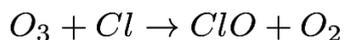
136.

Difficulty : Easy

Topics :

Force on a current carrying conductor placed in uniform magnetic field,
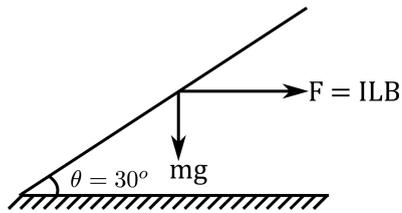
$$mg \sin 30 = ILB \cos 30$$

$$\frac{1}{2}L \times 10 \times \frac{1}{2} = IL\ \frac{1}{4}\ \frac{\sqrt{3}}{2}$$

$$\frac{20}{\sqrt{3}} = I$$

$$\frac{20}{1.732} = I$$

137.

Difficulty : Easy

Topics :

Magnetic materials,

The work required to do this comes from the current source

138.

Difficulty : Medium

**Topics :**

Alternating current,

$\text{Power} = I_{\text{rms}}^2 R$

$X_L = \omega L$

$= 314 \times 20 \times 10^{-3}$ $\qquad X_C = \dfrac{1}{\omega C} = \dfrac{1}{314 \times 100 \times 10^{-6}}$

$= 628 \times 10^{-2}$ $\qquad X_C = \dfrac{10^4}{314} = 31.847$

$= 6.28 \ \Omega$

$I_{\text{rms}} = \dfrac{10}{\sqrt{2}\sqrt{50^2 + (31.847 - 6.28)^2}} = \dfrac{10}{\sqrt{2} \times \sqrt{2500 + 653.671}}$

$I_{\text{rms}} = \dfrac{10}{\sqrt{2} \times \sqrt{3153.67}} = \dfrac{10}{1.414 \times 56.157} = \dfrac{10}{79.406}$

$I_{\text{rms}} = 0.1259$

$I_{\text{rms}} = 0.015855$

$P = I_{\text{rms}}^2 R = 0.7927 \ W$

139.

Difficulty : Medium

Topics :

Current electricity,

$R = \dfrac{V}{I}$

$R = \dfrac{5\text{div}}{10^{-3}A} \dfrac{\text{volt}}{20\text{div}} = \dfrac{5000}{20}$

$R = 250$

140.

Difficulty : Easy

Topics :

Ray Optics,

f=-15

O   2f   f
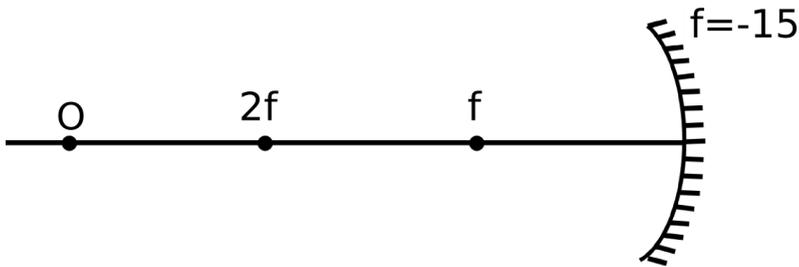
$$\frac{1}{V_1} + \frac{1}{-40} = \frac{1}{-15} \qquad \frac{1}{V_1} = \frac{1}{40} - \frac{1}{-15} = \frac{15 - 40}{600}$$

$$\frac{1}{V_1} = \frac{-25}{600} \qquad V_1 = \frac{-600}{25} = -24$$

$$\frac{1}{V_2} + \frac{1}{-20} = \frac{-1}{15} \qquad \frac{1}{V_2} = \frac{-1}{15} + \frac{1}{20} = \frac{-5}{300} \qquad V_2 = -60$$

Displacement $60 - 24 = 36$ away from the mirror

141.

Difficulty : Easy

Topics :

Electromagnetic waves,

$\vec{E} \times \vec{B} \Rightarrow$ gives wave direction
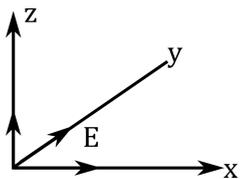
$\therefore \quad \vec{B}$ is along $+ z$ direction

142.

Difficulty : Medium

Topics :

Ray Optics,

$$\sin i = \sqrt{2}\sin 30^o$$

$$\sin i = \frac{\sqrt{2}}{2}$$

$$i = 45^o$$
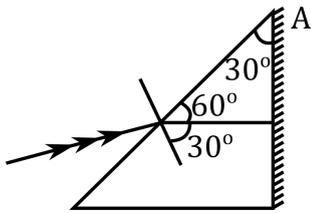
143.

Difficulty : Easy

Topics :

MAGNETISM,

$$E = \frac{1}{2}Li^2$$

$$25 \times 10^{-3} = \frac{1}{2}L \times (60 \times 10^{-3})^2$$

$$50 \times 10^{-3} = L\, 3600 \times 10^{-6}$$

$$\frac{50 \times 10^{-3}}{36 \times 10^{-4}} = L \quad 1.388 \times 10^{+1}$$

$$L = 13.89\,H$$
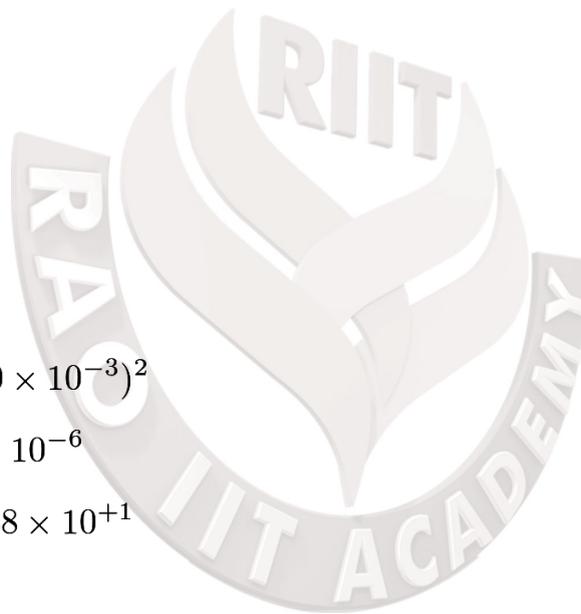
144.

Difficulty : Medium

Topics :

Semiconductors,
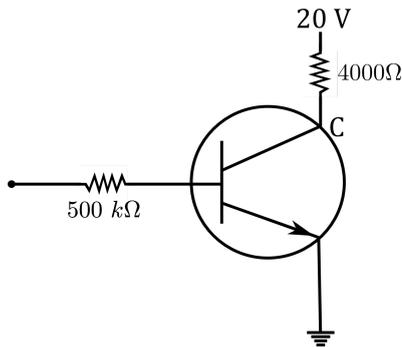
$$I_C = \frac{20}{4000}$$

$$I_C = 0.5 \times 10^{-2}$$

$$I_C = 5 \times 10^{-3} mA$$

$$I_B = \frac{20}{500 \times 10^3} = \frac{40}{1000 \times 10^3} = 40 \times 10^{-3} = 40 \mu A$$

$$\beta = \frac{5 \times 10^{-3}}{40 \times 10^{-6}} = \frac{5000}{40} = 125$$

145.

Difficulty : Easy

Topics :

Semiconductors,

Affects the overall V - I characteristics of p-n junction

146.

Difficulty : Easy

Topics :

Logical Gates,

$$Y = (A \cdot \bar{B}) + \bar{A} \cdot B$$

147.

Difficulty : Easy

Topics :

Polarization,

Reflected light is polarised with its electric vector perpendicular to plane of incidence

148.

Difficulty : Medium

Topics :

Wave optics,

$$\theta = \frac{B}{D} = \frac{\lambda D}{dD} = \frac{\lambda}{d}$$

$$\frac{0.20 \times \frac{\pi}{180} = \frac{5896 \times 10^{-10}}{2 \times 10^{-3}}}{0.2 \times \frac{\pi}{180} = \frac{5896 \times 10^{-10}}{d}}$$

$$\frac{0.20}{0.21} = \frac{d}{2 \times 10^{-3}}$$

$$\frac{40}{21} = d$$

$$d = 1.90 \, mm$$

149.

Difficulty : Medium

Topics :

Optical Instruments,

$$m = \frac{f_0}{f_e} \quad \Delta\theta = \frac{0.61\lambda}{a}$$

∴ Large focal length and small diameter

150.

Difficulty : Easy

Topics :

Atomic Structure,

$$KE = \frac{Ze^2}{8\pi\varepsilon_0 r}$$

$$TE = \frac{-Ze}{8\pi\varepsilon_0 r}$$

$$\frac{KE}{TE} = \frac{1}{-1}$$

151.

Difficulty : Medium

Topics :

Modern Physics,

$$\lambda = \frac{h}{mV} \qquad\qquad V = V_0 + \frac{eE_0}{m}t$$

$$= \frac{h}{m\left(V_0 + \frac{eE_0}{m}\right)t}$$

$$= \frac{h}{mV_0\left(1 + \frac{eE_0}{mV_0}\right)t}$$

$$= \frac{\lambda_0}{\left(1 + \frac{eE_0}{mV_0}\right)t}$$

152.

Difficulty : Easy

Topics :

Modern Physics,

$$N_0 = 600$$
$$N = 150$$
$$\therefore 2t\frac{1}{2} = 20\,\text{min}$$

153.

Difficulty : Easy

Topics :

Modern Physics,

$$\frac{1}{2}mv_1^2 = h2\nu_0 - h\nu_0$$

$$\frac{1}{2}mv_2^2 = 5h\nu_0 - h\nu_0$$

$$v_2 = 2v_1$$

$$\frac{1}{2} = \frac{v_1}{v_2}$$

154.

Difficulty : Medium

Topics :

Wave optics,

$$\frac{n\lambda}{2} + \frac{\lambda}{4} = 20 + e$$

$$(n+1)\frac{\lambda}{2} + \frac{\lambda}{4} = 73 + e$$

$$\frac{\lambda}{2} = 53$$

$$\lambda = 106 \quad \lambda = 1.06 \ m$$

$$V = \nu\lambda = 320 \times 1.06$$

$$= 339 \ m/s$$

155.

Difficulty : Medium

Topics :

Capacitors,

Independent

156.

Difficulty : Easy

Topics :

Electrostatics,

Equal $t = \sqrt{\dfrac{2h}{eE}}$

$$t = \sqrt{\frac{2h}{eE}}$$

157.

Difficulty : Easy

Topics :

Simple harmonic motion,

$$20 = \omega \propto 5$$

$$\omega = 2$$

$$T = \frac{2\pi}{2} = \pi$$

158.

Difficulty : Medium

Topics :

Heat and thermodynamics,

$$P = KT_0^4$$

$$P' = K \left(\frac{4T_0}{3} \right)^4$$

$$P' = \frac{256}{81} P$$

159.

Difficulty : Medium

Topics :

ELECTRICITY,

$$\lambda = \frac{\frac{F}{A}}{\frac{\Delta l}{l}} \quad Y = \frac{F'}{\frac{3A}{\frac{\Delta l}{l/3}}} = \frac{E}{\frac{A}{\frac{\Delta l}{l/1}}}$$

$$F' = 9 \ F$$

160.

Difficulty : Easy

Topics :

Viscosity newton's law of viscosity,

$$P = FV$$
$$F = 6\pi\eta rV$$
$$P = 6\pi\eta rV^2$$
$$V \propto r^2$$
$$P \propto r^5$$
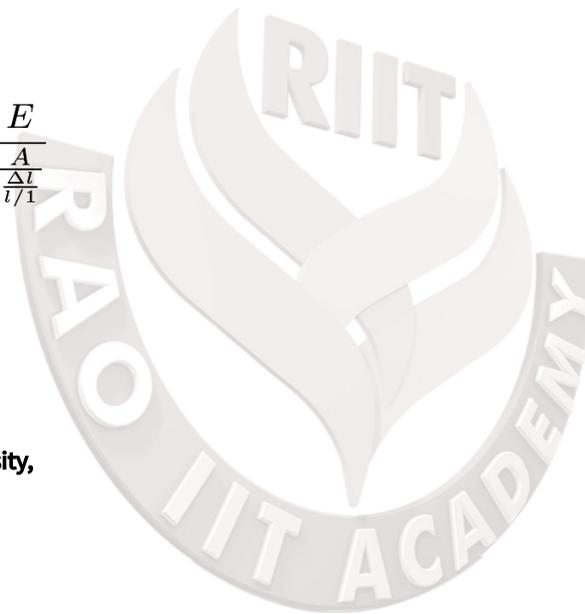
161.

Difficulty : Easy

Topics :

Heat and thermodynamics,

$\Delta Q = \Delta U + W$

$54 \times 4.2 = \Delta U + 10^5 (167.1 \times 10^{-6}.1 \times 10^{-6})$

$54 \times 4.2 = \Delta U + 10^5 \times 10^{-6} (16.7)$

$226.8 - 16.7 = \Delta U$

$210 \; J = \Delta U$

162.

Difficulty : Medium

Topics :

ELECTRICITY,

$\dfrac{qE}{m} t = 6 \qquad O \to 6 \to O$

$\qquad\qquad\qquad \leftarrow \; 6 \; m/s$

$\dfrac{1}{2} \times \dfrac{qE}{m} t^2 = \dfrac{6t}{2} = 3m, \; 3m, \; 3m$

$U_{av} = \dfrac{3}{3} = 1 \; m/s \qquad \dfrac{9}{3} = 3 \; m/s$

163.

Difficulty : Medium

Topics :

Newton's Laws of motion,

$a = g \tan \theta$

164.

Difficulty : Medium

Topics :

Rotational Motion,
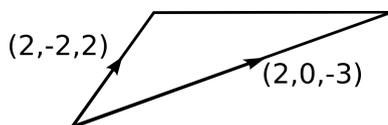
$(2\vec{j} - \vec{k}) \times (4\vec{j} + 5\vec{j} - 6\vec{k})$

$-8\vec{k} - 12\vec{i} + 4\vec{j} + 5\vec{j}$

$-7\vec{i} - 4\vec{j} - 8\vec{k}$

165.

Difficulty : Easy

Topics :

Errors,

$L.C = .001\ cm$

$5\ mm + 25 \times .01\ mm$

$= 5.25 + .04\ mm$

$= 5.29$

$= 0.529\ cm$

166.

Difficulty : Medium

Topics :

System of particles,

$mV = 4mv'$

$v' = \dfrac{V}{4}$

$e = \dfrac{v'}{V} = \dfrac{1}{4}$

167.

Difficulty : Easy

Topics :

Circular motion,

$\sqrt{2gh} = \sqrt{5g\left(\dfrac{D}{2}\right)}$

$2h = \dfrac{5}{2}D$

$\boxed{h = \dfrac{5}{4}D}$

168.

Difficulty : Medium

Topics :

Rotational Motion,

$$W.D = DK.E = \frac{1}{2}I\omega^2$$
$$I_R > I_D > I_S$$
$$K.E._C > K.E._B > K.E_A$$

169.

Difficulty : Medium

Topics :

Friction,

Coefficient is dimensionless

170.

Difficulty : Medium

Topics :

Rotational Motion,

No external torque so momentum conserved

171.

Difficulty : Medium

Topics :

Gravitation,

$$K_A > K_B > K_C$$
$$\Rightarrow V_A > V_B > V_C$$

172.

Difficulty : Difficult

Topics :

Rotational Motion,

$$\frac{\frac{1}{2}mv^2}{\frac{1}{2}mv^2 + \frac{1}{2}\frac{2}{5}mR^2 \frac{V^2}{R^2}} = \frac{1}{1 + \frac{2}{5}}$$
$$= \frac{5}{7}$$

173.

Difficulty : Medium

Topics :

Gravitation,

$$g = \frac{Gm}{R^2} \Rightarrow \text{ hence g changes}$$

174.

Difficulty : Medium

Topics :

Kinetic theory of gases,

$$\frac{3KT}{2} = \frac{1}{2}mv^2$$
$$\frac{3 \times 1.38 \times 10^{-23}T}{2.76 \times 10^{-26}} = (11.2)^2 \times 10^6$$
$$T = 8.36 \times 10^4$$

175.

Difficulty : Easy

Topics :

Heat and thermodynamics,

$$\frac{W.D}{\Delta Q} = \frac{P\Delta V}{P\Delta V + \frac{3}{2}R\Delta T} = \frac{1}{1 + \frac{3}{2}} = \frac{2}{5}$$

176.

Difficulty : Easy

Topics :

Sound wave,

$$\frac{V}{2L_1} = 3\frac{V}{4L_2}$$
$$L_1 = \frac{2}{3} \times 20 = \frac{40}{3} = 13.33$$
$$= 13.2$$
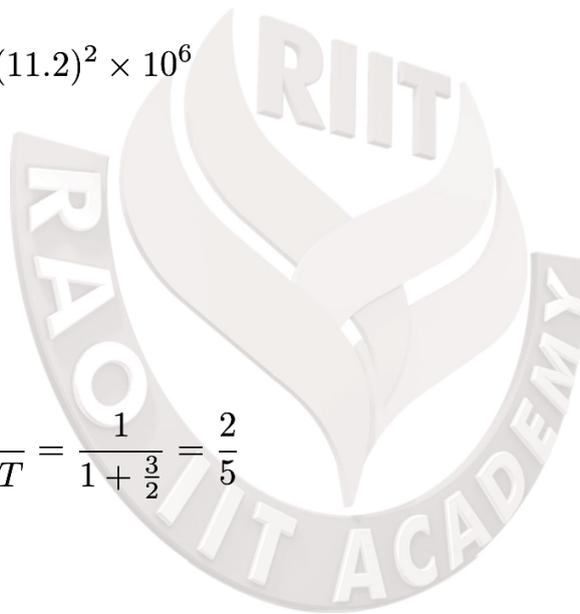
177.

Difficulty : Easy

Topics :

Heat and thermodynamics,

$$n = \left(1 - \frac{T_2}{T_1}\right) \times 100$$

$$= \left(1 - \frac{273}{373}\right) \times 100$$

$$= \frac{100}{373} \times 100 = 26.8\%$$

178.

Difficulty : Easy

Topics :

Current electricity,

Green = 4

Violet = 7

Multiple is 1000 and 50 orange

179.

Difficulty : Medium

Topics :

Current electricity,

$$(nR + R)I = E$$

$$\left(\frac{R}{n} + R\right) 10I = E$$

$$R(n + 1) = R\left(\frac{1}{n} + 1\right) 10$$

$$n^2 + n = 10 + 10n$$

$$n^2 - 9n - 10 = 0 \quad n = 9 \pm \frac{\sqrt{81 + 4 \propto 10}}{2}$$

$$n = \frac{9 \pm \sqrt{121}}{2} = \frac{9 \pm 11}{2} = \frac{20}{2} = 10$$

180.

Difficulty : Medium

Topics :

Current electricity,

$nE = i(nr)$

$E = ir$

$\therefore i$ is independent of n