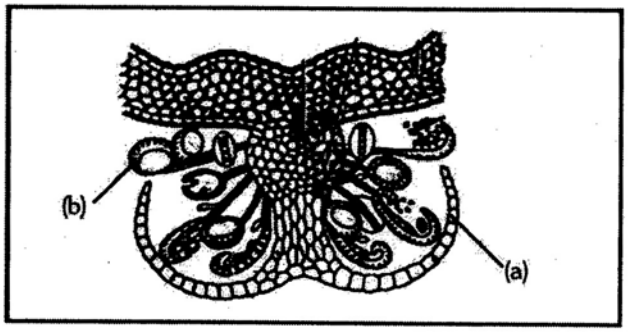
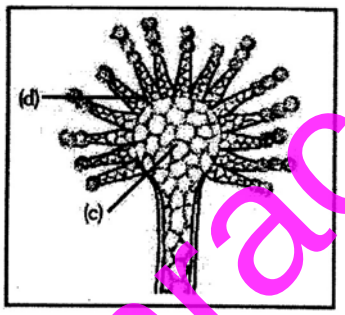
1. (A) Identify the given figure and label part (a) and (b)

(a) (b)



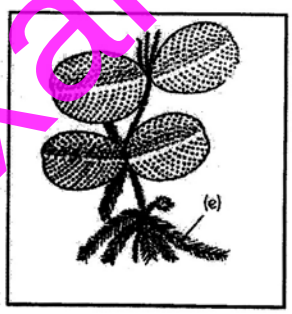
(B) Identify the given diagram and label part (c) and (d)

(c) (d)

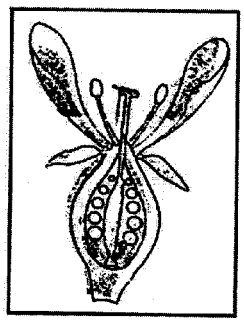


(C) Identify the given diagram and label (e) part

(e)



(D) (i) In the given figure diagram write the condition of flower on the basis of position of ovary

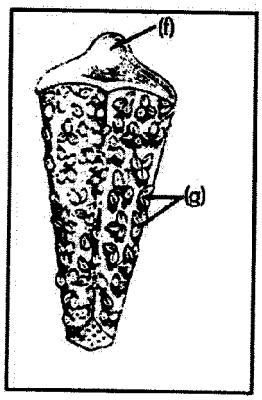


(ii) Out of the following given example write the most suitable examples for such flower

(Coriander, Cucumber, Pear, Apple)

(E) Identify the shown part and name the organism and lable (f) and (g).

(f) (g)



Sol.

(A) V.S. of *Dryopteris* Sporophyll through sorus region

a- Indusium b- Sporangium

(B) Aspergillus / Eurotium /

c- Vesicle d- Sterigmata / Phialides

(C) Salvinia

e- Submerged leaves

(D) Epigynous

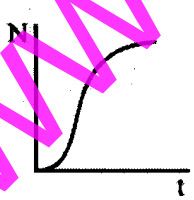
Cucumber, Pear, Apple ( )

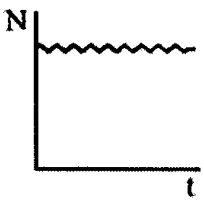
(E) Cycas - Microsporophyll [ ]

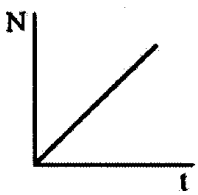
f - Apophysis g - Sori

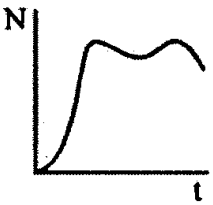
2. On the basis of graphs A, B, C, D and E answer the questions followed.

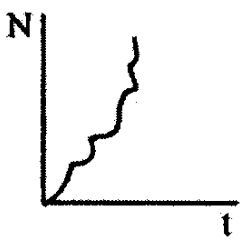
A, B, C, D E

(A) 

(B) 

(C) 

(D) 

(E) 

(A) Which graph represents the following informations ?

?

(a) Bacteria grown in limited nutrient meidum ( )

(b) Yeast grown in chemostate ( )

(c) Growth of human population from 10000 B.C. to today (10000)

(B) Write the name of two replication cycles that take place in virus

(C) Define habitat and niche. ( )

Sol. (A) (a) $\rightarrow$A, (b)$\rightarrow$(D), C$\rightarrow$(E)

(B) (1) Lytic cycle ( ) (2) Lysogenic cycle ( )

(C)

Habitat – Physical area covered by any organism or community is known as habitat.

Niche – The ecological niche of an organism represent the range of conditions that it can tolerate, the resources it utilises and its functional role in the ecological system. (Habitat + Function)

3. Match the contents of Column-I with the contents of Column-II.

Column-I	**Column-II**
(A) Recombinant DNA technology	(1) IGA
DNA	
(B) Passive immunity ( )	(2) PCR
(C) Thiobacillus ( )	(3) Colostrum ( )
(D) Methanogens ( )	(4) Helical symmetry ( )
(E) Bacteriophage ( )	(5) Thermos ( )
	(6) Lysogenic cycle ( )
	(7) Transduction ( )
	(8) Biomining ( )
	(9) Acid mine drainage ( )
	(10) Alkaliphiles ( )
	(11) Ruminants ( )
	(12) Helicobacter ( )
	(13) Detergents ( )
	(14) Tears ( )
	(15) Global warming ( )

Sol. A $\rightarrow$ 2, 5; B $\rightarrow$ 1, 3; C $\rightarrow$ 8, 9; D $\rightarrow$ 11, 15; E $\rightarrow$ 6, 7

4. Write genus, family, placentation, type of fruit and also write special feature of stamen for each of the following plant.

(a) Mustard ( ) (b) Cotton ( ) (c) Gram ( ) (d) Marigold ( ) (e) Lemon ( )

Sol.

		Genus	Family	Fruit	Placentation	Special feature of stamen
(a)	Mustard	Brassica	Brassicaceae	Siliqua	Pariental	Tetradynamous stamen
(b)	Cotton	*Gossypium*	Malvaceae	Luculicidal capsule	Axile	Monoadelphous stamens
(c)	Gram	Cicer	Leguminosae	Legume/Pod	Marginal	Diadelphous stamens
(d)	Marigold	Tagetes	Compositae	Cypsela	Basal	Syngenesious stamens
(e)	Lemon	Citrus	Rutaceae	Hesperidium	Axile	Polyadelphous stamens

5. Complete the following statements (i) to (iv) by picking up the correct alternative from those given in the box below-

(i) (iv)

[Candituft, Guava, Peach, Nymphaea, Cycades, Cucurbita, Salvinia, Isoetes, Vallisneria, Nandadevi, Karnataka, Nilgiri, Maharastra]

[ ]

(i) The inferior overy is found in ..... and .....

(ii) Rooted hydrophyte with floating leaves plants are ..... a pteridophyte and ..... an angiosperm.

(iii) Diaoecious plant are .....gymnosperm and ..... an agiosperm.

(iv) The first biosphere reserve is ..... and is situated in three states..... Kerala and Tamilnadu.

Sol.

(i) Cucurbnita, Guava. ( ) (ii) Salvinia, Nymphaea ( )

(iii) Cycades, Vallisneria ( ) (iv) Nilgiri, Karnataka ( )

6 Complete the following statements (a) to (e) by picking up the correct words from those given in box below.

[Cephalosporin, Archaebacteria, Cyclosporin, UNCED 1992, WBBC 2001, Brazil, Sweden, Ant, Termite, Cycas, Soyabean, Kenya, nematode, Fungus, Metadringe, Rhizobium]

[UNCED 1992, WBBC 2001]

(a) Potent Immunosuppresent drug is.....which is obtained from a .....
....

(b) The roots of Pinus and ..... are assoicated with Amanita and .....respectively.
....

(c) In tropical region, paddy field soil harbour rich population of .....produce methane.
....

(d) Agenda 21 .....was passed in.....
21, ...

Sol. (a) Cyclosporin, Fungus ( )

(b) Soyabean, Rhizobium ( )

(c) Archaebacteria ( )

(d) UNCED 1992, Brazil

7. Answer each of the following question is brief.

(a) Write the biochemical difference between anaerobic respiration and fermentation.

(b) What is the causal organism of black rust of wheat ? Write its all type of spores in sequence ?
? ?

(c) How Bt–toxin kills insects ?
Bt– ?

(d) What is the source of statins and how they reduce the level of cholesterol in body ?
? ?

(e) Write the technical term for VAM haustoria. (VAM)

Differentiate the following examples of endomycorrhiza & ectomycorrhiza.

Ex. Sclerocystis, Laccaria, Gigaspora, Glomus, Hebeloma, Psilocybes

Sol. (a) Anaerobic respiration / Fermentation /

(1) This is induced by endoenzymes This is induced by exoenzyme

(2) Production of ATP occurs No ATP production

ATP

(3) It is intracellular biochemical reaction Extracellular biochemical reaction

(b) Causal organism of black rust of wheat is Puccinia graminis.

Basidiospores →Pycniospores →Aeciospores→Uredospores→Teleutospores

→ → → →

(c) Bt–toxin binds to the surface of midgut epithelial cells and makes it porus, that cause cell swelling and lysis leads to death of the insect.

Bt–

(d) Monascus purpureus, It inhibits he enzyme by competitive inhibition which is responsible for synthesis of cholesterol.

(e) Peletons / Arbuscule/vesicle

Ectomycorrhiza	– Laccaria
	– Hebeloma
	– Psilocybes
Endomycorrhiza	– Sclerocystis
	– Glomus
	– Gigaspora

8. Match the column I with column– II. (Match as many as possible)

– I	**– II**
(A) Tricophyton	(i) DEVINE
(B) Trichoderma	(ii) BINDAD–P –P
(C) Phytophthora	(iii) Bovarine
(D) Arthrobotrys	(iv) Collego
(E) Metarrhizium	(v) Bionematecide
	(vi) Bioherbicide
	(vii) Bioinsecticide
	(viii) Hair
	(ix) Nail
	(x) Skin
	(xi) Lungs
	(xii) Liver
	(xiii) Nose
	(xiv) Ringworm
	(xv) ROGEM–300 –300
	(xvi) BIotrol
	(xvi) Rhizoctonia
	(xvi) Velncel

Sol. (A) – (viii), (ix) (x), (xiv) (B) – (xvi), (xvii) (C) – (i), (vi) (D) – (v) (E) – (vii), (xiii)

9. Answer the following question ?

(i) What is necleosome? How many base pairs are present in a typical nucleosome?

(ii) What is riboszyme? Who discovered it and in which organism?

(iii) What are four main objectives of genetically modified crop plants?

(iv) From which plant part phellogen originates? and what are its main products?

(v) Why penicillin is not effective in primary atypical pneumonia?

Sol. (i) Nucleosome is structural unit of chormatin each nucleosome have an octamer or core particle (4 × 2 histones H_2A, H_2B, H_3, H_4). It is spirally wrapped by DNA having 150 bp. Two nucleosome are connected by linker DNA– 15-55 bp.

(4 × 2

histones H_2A, H_2B, H_3, H_4) DNA spirally wrapped 150 bp

DNA– 15-55 bp

(ii) The enzymes made up of RNA is called *Ribozyme*, It was discovered by Thomas Cechs and Sydney Altmann in a protozoan Tetrahydmena thermophila.

RNA

(iii) (1) These crops are more tolerant to abiotic stresses like cold, draught, salt, heat etc.

(2) To reduce reliance on chemical pesticides (Pest resistant crop)

(3) To reduce post harvest losses. ( )

(4) To increase efficiency for mineral uptake by plants. ( )

(iv) In stems it originates from outer most layer of cortex or hypodermis and in roots originates from pericycle and its products are phellem & phelloderm / secodary cortex.

(v) This disease caused by *Mycoplasma* pneumonia and Mycoplasma is resistant to penicillin.

10. Write the major difference between each of the five pairs (a) to (e) ?

(a) (e) ?

(a) Standing crop and standing state. ( )

(b) Structure of flagellum in Gram +ve and Gram –ve bacteria.

(c) Photosythesis of chlorobium and Nostoc.

(d) Chemical composition of cell wall of E. coli and Methanococcus.

(e) Spore formation in Claviceps and Agaricus.

Sol. (a) Standing crop is total amount of living organic matter present in per unit area in particular time in an ecosystem, while standing state is total amount of inorganic matter present in per unit area at a particular time in a ecosystem.

(b) In flagellum of gram (+ve) bacteria basal body is surrounded by one pair of rings (S and M), while in Flagellum of gram (–ve), basal body is surrounded by two pairs of rings (L, P and S, M)

(+ve) (S M)

(L, P and S, M)

(c) In chlorobium bacterium photosynthesis is non oxygenic, while in Nostoc photosynthesis is oxygenic.

(d) Cell wall of E. coli bacterium in made up of peptidoglycan, or glycopetide, while cell wall of Methanococcus is made up of complex polysaccharides and complex polypeptide.

(e) In Claviceps formation of spores is endogenous, while in Agaricus formation of spores is exogenous.

11. Write the corect answer according to given instruction :

(a) Incus, Malleus, Stapes — Write correct sequence of ear ossicles (if wrong) and their overall function.

(b) Ctenophora, Echinodermata – Differentiate according to body organisation and body symmetry.

(c) Cockroach and Frog – Differentiate according to position of heart and organs of respiration.

(d) P-wave and QRS complex – What they represent and what they initiate.

P QRS

(e) Corpus callosum and corpus luteum - Differentiate according to location and function.

Sol. (a) Malleus, Incus, Stapes ( )

They provide vibration in ear drum and help in conduction of sould wave.

		Body organisation ( )	**Symmetry** ( )
(b)	Ctenophora ( )	Tissue grade	Biradial ( )
	Echinodermata( )	Organ system grade (	Pentaradial ( )
		Location of heart (	**Respiratory organs( )**
(c)	Cockroach ( )	Dorsal surface ( )	Trachea ( )
	Frog ( )	Ventral surface (	Lungs ( )

(d) They represent electrocardiogram of heart ( )

P-wave leads to auricular depolarisation (P–)

QRS - complex lead to ventricular depolarsiation / QRS –

(e)

	Corpus callosum ( )	**Corpus luteum ( )**
Location ( )	Brain ( )	Ovary ( )
Function ( )	It coordinates and connect both cerebral hemisphere	It secrets progesterone

12. (a) What does gamete intrafallopian transfer (GIFT) represent ? (Define in brief)

(b) How do CU-T and CU-7 act as a contractive devices ?

7

(c) Which genetic disorder, shows gynaecomastia like character and what is karyotype ?

(d) During early location, what is the specific name for first milk and what is its function in new born human body ?

(e) Write correct sequence of accessory ducts in human testis after seminiferous tubules ?

Sol. (a) It is an assisted reproductive technique of *invivo* fertilization in which transfer of an ovum, collected from a donar into the fallopian tube of another female, who cannot produce ovum, but can provide suitable environment for fertilization.

(b) Prevent implantation of blastocyst in uterus.

(c) Klinefelter's syndrome –

Karyotype – 44 + XXY (Trisomy for sex chromosome) or 44 + XXXY (Tetrasomy for sex chromosome)

(d) Colostrum ( )

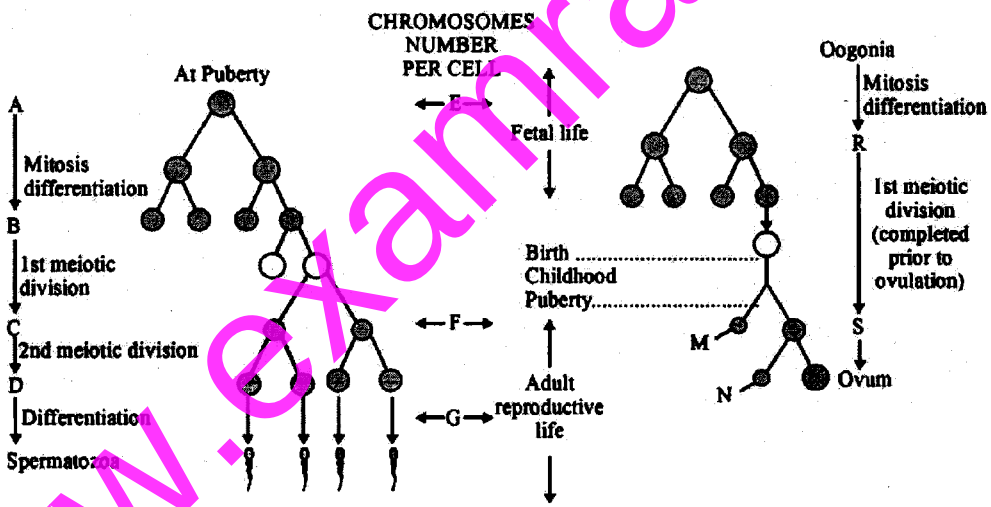
It provides immunoglobulins (Ig A) and protect the neonates (newly born) against pathogens / provides passive immunity and all nutrients.

IgA)

(e) Rete testis → Vasa efferentia → Epididymis → Vasa deferens → Urethra

→ → → →

13. According to the given diagram of human gametogenesis answer the following questions ?



(a) Name the stages A,B, C and D

A, B, C D

(b) Write the numerical value of E, F and G

E, F G

(c) Which structure are represented by R and S ?

R S ?

(d) Identify M and N, why M is smaller than S and N is smaller than ovum and what is the significance of it?

M N M, S N,ovum

Sol. (a) A – Spermatogonia ( )

B – Primary spermatocyte ( )

C – Secondary spermatocyte ( )

D – Spermatid ( )

(b) E = 46, F = 23, G = 23

(c) R – Primary oocyte ( )

S – Secondary oocyte ( )

(d) M – Ist polar body ( )

N – IInd polar body ( )

because, it contains negligible amount of cytoplasm due to unequal cytokinesis during maturation division

Significance – To get rid of an extra set of chromosome and make the gamete haploid.

–

14. Match the column I to column – II

	Column - I		**Column - II**
(A)	Kangaroo rat	(i)	Nitrogen (
		(ii)	SO_2
(B)	Diesel automobile	(iii)	Suspended particular matter ( )
		(iv)	Excess flouride in water ( )
(C)	Methemoglobinaemia	(v)	Excess nitrate in water ( )
		(vi)	Wolf ( )
(D)	Endangered species	(vii)	Wild ass ( )
		(viii)	Red panda ( )
(E)	Ozone hole	(ix)	Great Indian bustard ( )
		(x)	Paddy field ( )
		(xi)	CFC ( )
		(xii)	100 km. wide hole (100 km.)
		(xiii)	Can be fatal to infant ( )
		(xiv)	May live whole life without water ( )
		(xv)	Excrete solid urine ( )
		(xvi)	Urea is the main excretory product ( )
		(xvii)	Methyl mercury in water ( )
		(xviii)	Methyl isocyanata ( )

Sol. (A) – (xiv), (xvi)

(B) – (ii), (iii)

(C) – (v), (xiii)

(D) – (vi), (vii), (viii), (ix)

(E) – (xi)

15. Fill in the blanks with the help of given words in box –

(Monera, Active, Passive, Dinucleotide, Dinucleoside uridine, SER, Deoxythymine, Glycoprotein, RER, Glyceride, Glycerol, Animal, Plant, Animalia, Allosteric enzyme, Competitive, Feedback, Leydig cell, Sertoli cell, Glycogen, Triacyl glycerides, Protista)

(SER, RER,

)

(a) Most of cyanobacteria (blue green algae) belong to kingdom .....

.....

(b) FAD and NAD enzyme cofactor are formed of .....

FAD NAD .....

(c) The maximum fat stored in our body is in form of .....

.....

(d) Thymidine in DNA is replaced by ..... in RNA.

DNA RNA .....

(e) Most of the fats (Lipids) and steroid hormone are synthesized by ..... in the cell.

.....

(f) Castrastion of male cattle leads destruction of ..... cells, which secrete testosterone hormone.

.....

(g) The movement of neutral solute molecules across cell membrane is a type of ..... process.

.....

(h) The centriole forms spindle during cell division in ..... cells

.....

(i) Golgi body, associated to RER, if separated away, will not form .....

RER .....

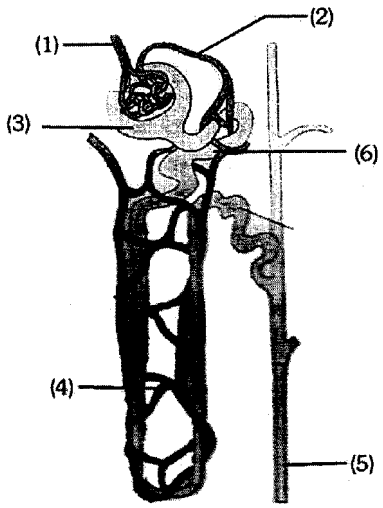
(j) The activity of enzyme inhibited when modulators bind to it known as ..... inhibition.

.....

Sol.

(a) Monera	(c) Triacyl glycerides	(e) S.E.R
(b) Dinucleotide	(d) Uridine	(f) Leydig
(g) Passive	(i) Glycoprotein	
(h) Animal	(j) Allosteric enzyme	

16.



(a) (i) Udebtuft 3,4, 5 and 6 in above figure.

3,4, 5 6

(ii) What is the functional of 3 ?

3 ?

(iii) If diameter of '2' is made double to the part (1) then what will be the effect ?

'2' (1) ?

(b) If the prostate gland is enlarged in old age then what will beeffect on urination ?

?

Sol. (a) (i) 3 — Bowman's capsule ( )

4 — Ascending limb of loop of Henle ( )

5 — Collecting duct ( )

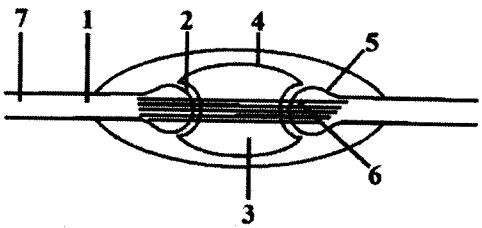
6 — Proximal convoluted tubule ( )

(ii) Ultrafiltration convoluted tubule ( )

(iii) No ultrafiltration of blood / ultrafiltration of blood will be stopped / Ultrafiltration will not occur.

(b) Intermittant urination. There will be obstruction in the flow of urine of urethral passage.

17. The given figure is of elbow joint :–



(a) Given the names of parts 1, 2, 3 and 4 in above figure.

'1', '2', '3' '4 '

(b) Given functions of 2 and 3.

'2', '3'

(c) Besides, connective tissues, which other tissue is present in this fig. and write its function and how does it work ?

(d) Name one other such joint found in our body and give the name of the structure analogous to part (1) in above fig.

(1)

Sol. (a) 1. Human bone ( )

2. Hyaline articular cartilage. ( )

3. Synovial fluid ( )

4. Synovial membrane ( )

(b) 2. It covers he articular surface to reduce friction between them and acts as shorber.

3. Presence of this fluid lubricates the joint and helps in increasing, its smooth mobility.

(c) Here muscular tissue is also shown in the diagram, This tissue has a contractile property. Contraction in muscles fibre reduces its length and causes movement of bones at the joint

(d) Knee joint is another such joint and bone analogus to part (1) is femur.

(1)

18. (a) Draw the pedigree of the given family whose ages are given below in the bracket

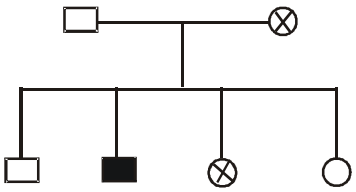
Normal father	( )	(70)
Carrier mother	( )	(65)
Normal son	( )	(40)
Affected son	( )	(37)
Carrier daughter	( )	(33)
Normal daughter	( )	(30)

(b) If this family can never have an affected girl then with the help of Punnette square method, whether this disease can be phenylketonuria, Yes or No ?

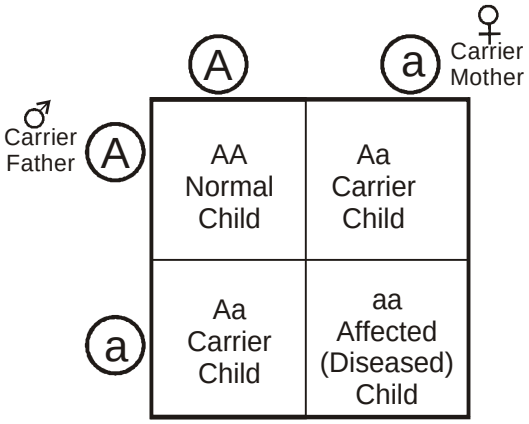
(Let dominant allele – A, Recessive allele – a)

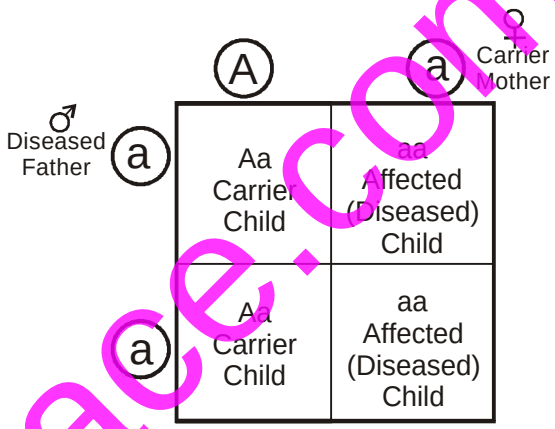
A, a)

Sol. (a) Pedigree is /



(b) No, If there is Phenulketonuria, father must be diseased or carrier.





19. Here 8 statements with some informations are given belows.

(A) Which of the following statements are correctly mathced.

(B) If any one statement incorrect then rewrite the statement in coreect form.

(i) Dryopithecus : Walked more ape like than Ramapithecus, who walked more like human.

(ii) Neanderthal man : It's cranial capacity was 900 C.C.

900 C.C.

(iii) Miller's experiment : He heated the mixture of H_2 , NH_3, CH_4 and water vapour at 800 °c

H_2 , NH_3, CH_4 800 °c

(iv) Darwin's finches : Adaptive radiation

(v) Australopithecus : Who lived in Australia and neighbouring islands.

(vi) Hardy Weinberg equilibrium : Allele frequencies in population are unstable and is fluctuating or unstable from generation to generation.

(vii) Camouflage : An organism showing resemblence with external environment, animal or plant for the purpose of protection.

(viii) Conifers : Originated in devonian period and flourished in triassic period.

Sol. A – i, iii, iv, vii and viii

B–(ii) Neanderthal man : cranical capacity was 1400 CC/1300–1600 CC

1400 CC/ 1300 –1600 CC

(v) Australopithecus : Lived in east African grassland / Africa.

(vi) Hardy Weinberg equilibrium: Allele frequency in population are stable and remains constant from generation after generation.

20. Answer the following questions –

(a) How is the cancer cells different from normal cells ?

(b) Pick out the correct carcinogens out the following.

Asbestos, Infra red rays, Arsenic, Polythene, Casein, Caffein, Tobacco smoke, Gamma rays

(c) Write down three methods (write full forms wherever required) to detect cancer of internal organs.

Sol. (a)

	Cancer cells	**Normal cells**
1. Karyoplasmic index	Higher	Lower
2. Contact inhibition	absent	present
3. Cellular gene Cellular gene	oncogene	proto oncogene
4. Metastasis	present	absent

(b) Asbestos, Arsenic, Tobacco smoke, Gamma rays

(c) 1. Biopsy ( )

2. Fine needle aspiration pap smear cytology (pap smear)

3. Tumour markers in blood examination ( )

4. Immunological test for cancer specific antigens with the help of monoclonal antibodies.