

Each Work sheet will be of **2 Pages**. You are requested to prepare **at least 2 work sheets for each chapter**. The content will be limited to **any specific topic within the chapter** which you think important. **No mark or Grade will be given. Only 5 Questions** per Work sheet will be prepared. Leave Space for students work.

Type of Questions: MCQ/ Answer in a word or a sentence/ cross word puzzle/ fill in the blanks/match the following / one word substitution (terminology)/ Diagram labeling/True or false /or any other type decided by the teacher. PLEASE FOLLOW NCERT TEXT ONLY.

Work Sheet:	Chapter	Topic:	
1-A	No. 1	Asexual Reproduction	Tinsukia Region

- 1 Name the most invasive aquatic plant weed which is called as 'Terror of Bengal'.
- 2 Offsprings produced by asexual reproduction are referred to as clones. Why?
- 3 Study the relationship between first two words and suggest a suitable word for fourth place.
(a) Chlamydomonas : Zoospores :: Penicilium :
(b) Ginger : Rhizome :: Agave :
- 4 Fill in the gaps.
The period from birth to the natural death of an organism represents its.....
- 5 Asexual reproduction is seen in which of the following pair of organisms.
(a) Amoeba and Hydra
(b) *Penicillium* and *Hibiscus*
(c) Rose and Earthworm
(d) Leech and Cockroach

1 Tapeworms possess both male and female reproductive organs. What is the name given to such organism? Give two more examples of such organisms.

2 Fill the blank spaces a, b, c, and d given in the following table.

Organism	Organ	Gamete	a	Testes
Spermatozoa				

- 1 Water hyacinth (*Eichornia*)
- 2 Because offsprings produced by Asexual reproduction is morphologically and genetically identical to parent.
- 3 (a) Conidia (b) Bulbils
- 4 Life span
- 5 a. Amoeba Hydra and

Work Sheet:
1-B

Chapter
No. 1

Topic:
Sexual Reproduction

Tinsukia Region

Human female b Ovum
Plant (Angiosperm) c Pollen grains
Plant (pteridophytes) antheridium d

- 3 Fill in the blanks
The site of zygote formation is thepresent inside the ovule of a flowering plant.
- 4 Bryophytes and Pteridophytes produce a large number of male gametes but relatively very few female gametes. Give one reason.
- 5 The male gametes of rice plant have 12 chromosomes in their nucleus. The chromosome number in the female gamete, zygote and the cells of the seedling will be, respectively, a. 12, 24, 12 b. 24, 12, 12
c. 12, 24, 24 d. 24, 12, 24.

ANSWERS

- 1 Hermaphrodite; Examples : Earthworm, Leech.
- 2 a = Human male b = ovary c = Anther d = Antherozoid
- 3 Embryo sac
- 4 Because male gamete need medium (water) to reach egg/female gamete. A large number of the male gametes fail to reach the female gamete.
- 5 c. 12, 24, 24

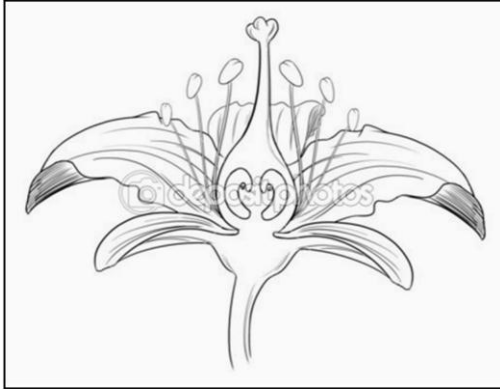
Work Sheet:
2-A

Chapter
No. 2

Topic:
PARTS OF FLOWER

TINSUKIA Region

- 1 What is thalamus?
- 2 Label any four parts of the given flower



- 3 Write any one function of corolla.
- 4 What is the function of androecium ?
- 5 What is the function of gynoecium ?

ANSWERS

- 1 In a flower , four different sets of whorls are attached to a central axis halamus. called t
- 2 Thalamus,androecium,gynoecium,calyx,corolla
- 3 Provides colour and scent to attract pollinators.
- 4 Production of pollen grains.
- 5 Production of megaspore, fruit and seed

Work Sheet:
2-B

Chapter
No. 2

Topic:
Male reproductive unit

Tinsukia Region

- 1 What is stamen?
- 2 Write the name of four wall of microsporangium?
- 3 Define microsporogenesis?
- 4 What is microspore tetrad?
- 5 What is sporopollenin?

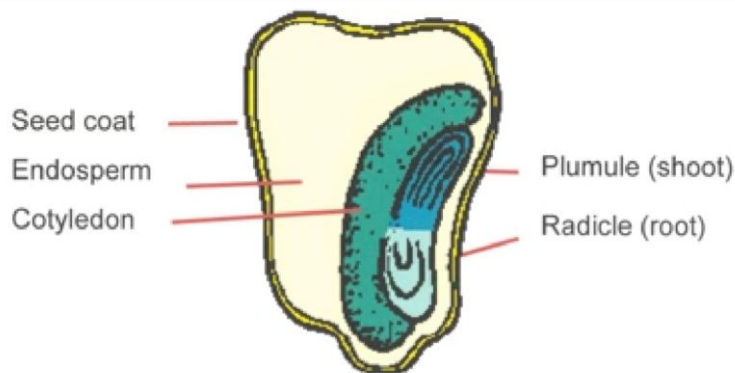
ANSWERS

- 1 Stamen is the male reproductive unit.
- 2 Epidermis,Endothecium,Middle layer,Tapetum
- 3 The process of formationof microspore from a pollen mother cell by meiosis is called microsporogenesis.
- 4 PMC undergoes meiotic division to form cluster of four cells called microspore tetrad.
- 5 The exine of pollen grain is a hard layer made of sporopollenin ,which is one of the most resistant organic

- 1 Draw the diagram of maize seed and label any four parts.
- 2 Write the example of two albuminous and non albuminous seed.
- 3 Write one difference between true and false fruit.
- 4 Give any two examples of fleshy and dry fruits.
- 5 Write short note on parthenocarpic fruits. Give an example.

ANSWERS

1



- 2 **Non- albuminous seed** : pea , groundnut.
Albuminous seed : wheat,maize .
- 3 **True fruits** : fruit that develops from only ovary, e.g. :pea , wheat , maize.
False fruits : fruits that develops from ovary and the thalamus, e.g. apple,straeberry.
- 4 **Fleshy fruits** : orange , mango, etc.
Dry fruits : mustard ,groundnut, etc.
- 5 Fruits that are formed without fertilization are called **parthenocarpic fruits**.These do not have seeds.e.g.: banana

- 1
 1. The process of gametogenesis starts at
 - a) The time of birth
 - b) Puberty
 - c) During embryogenesis
 - d) The childhood
 2. 16 primary spermatocytes undergoes the first meiotic division to form_____ haploid secondary spermatocytes.
 - a) 16
 - b) 32
 - c) 64
 - d) 08
 3. Sertoli cells provide _____ to the growing sperms.

- a) Nourishment
- b) Mobility
- c) Energy
- d) Lubrication

2 Match the following column A and B:-

COLUMN A

- I. Spermatogenesis
- II. Follicle stimulating hormone (FSH)
- III. ovulation.
- IV. acrosome.
- e) release of ovum
- VI. spermiogenesis.

COLUMN B

- a) anterior portion of sperm
- b) formation of a mature female gamete
- c) transformation of spermatids to sperm
- d) acts on the Sertoli cells
- V. oogenesis
- f) formation of a mature male gamete

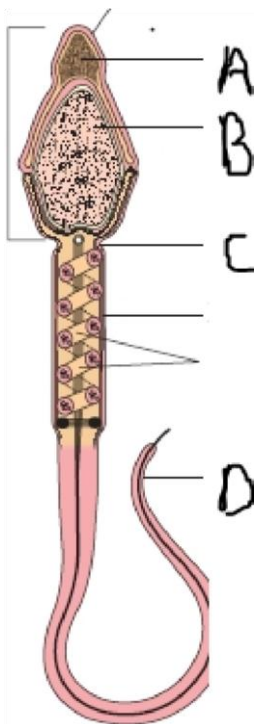
3 Fill in the following blanks:-

1. The release of sperm from seminiferous tubules is known as _____.
2. Sperm is composed of ahead, _____ and a middle piece.
3. Gametogenesis is the process of formation of _____ in gonads.
4. Tail in sperm helps in _____.
5. luteinising hormone (LH) acts at the Leydig cells and stimulates synthesis and secretion of _____.

4 State whether true or false.

1. The sperm head contains an elongated haploid nucleus.
2. The seminal plasma along with the sperms constitute the semen.
3. Oogonia are keep on forming though out the life in the ovary.
4. Antrum is the fluid filled cavity of tertiary follicle.
5. Middle piece of sperm have numerous plastids.

5



Label A, B, C and D in the above diagram - Structure of a sperm.

ANSWERS

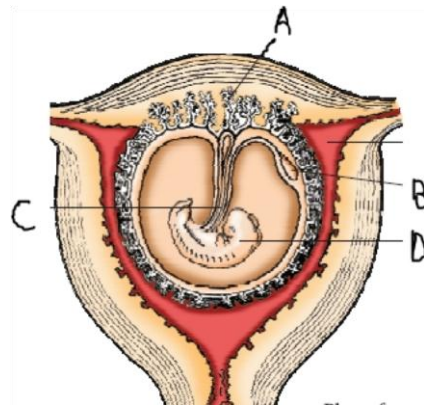
- 1
 1. B
 2. b
 3. a
- 2
 - I. f
 - II. d
 - III. e
 - IV. a
 - V. b
 - VI. c
- 3
 1. spermiation
 2. neck
 3. gametes
 4. Swimming
 5. androgens
- 4
 1. True
 2. True
 3. False
 4. True
 5. False
- 5
 - A. Acrosome
 - B. Nucleus
 - C. Neck
 - D. Tail

Work Sheet: 3-B	Chapter No. 3	Topic: Pregnancy and Embryonic Development	Prepared by: Tinsukia Region
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- 1 Fill in the following blanks:-
 1. _____hormone maintain the pregnancy.
 2. Three embryonic layers which give rise to all organs in adults are _____, _____ and _____.
 3. Most of the major organs are formed by the end of _____ trimester.
 4. The placenta is connected to the embryo through an _____.
 5. _____ hormone is produced in women only during pregnancy.
 - 6.
- 2 Name the hormones secreted by placenta.
- 3 During pregnancy the levels of other hormones like estrogens, progesterones, cortisol, prolactin, thyroxine, etc., are increased several folds in the maternal blood. Why?

- 4 State whether true or false.
1. Finger like projections which appear on trophoblast are called chorionic villi.
 2. A hormone called relaxin is secreted by the embryo.
 3. By the end of the second month of pregnancy, the foetus develops limbs and digits.

5



Label A, B, C and D in the above diagram -The human foetus within the uterus.

ANSWERS

1. Progesterone
 2. Ectoderm, mesoderm and endoderm
 3. First
 4. Umbilical cord
 5. hCG/ hPL/ relaxin
- 2 human chorionic gonadotropin (hCG), human placental lactogen (hPL), estrogens, progestogens and relaxin
- 3 They are essential for the growth of foetus.
1. true
 2. false
 3. true
- A. Placental villi
 - B. Yolk
 - C. Umbilical cord
 - D. Embryo

Work Sheet:

3C

Chapter

No. 3

Topic:

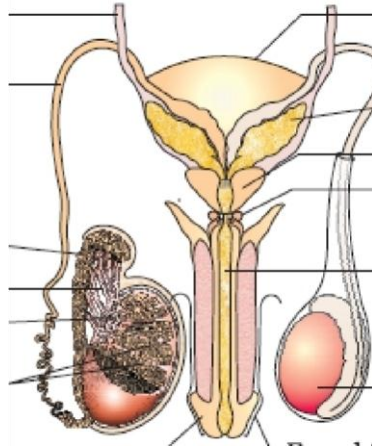
Male Reproductive
System

Tinsukia Region

1 One word substitution :

1. Helps in maintaining the low temperature of the testes.
2. Each lobule contains one to three highly coiled.
3. Compartments present in testis.
4. Two types of cell which line seminiferous tubule.
5. Cells which secrete androgens in testes.

2 Label the following diagram:



3 Match the following column A with B:

Column A

1. seminal plasma
2. Leydig cells
3. Sertoli cells
4. rete testis

Column B

- a) accessory ducts
- b) rich in fructose, calcium
- c) synthesise and secrete androgens
- d) provide nutrition

4 Fill in the blanks:

1. The _____ is the male external genitalia.
2. Secretions of male accessory glands constitute the _____.
3. glans penis is covered by a loose fold of skin called _____.

ANSWERS

1. Scrotum
2. seminiferous Tubules
3. testicular lobules
4. male germ cells and Sertoli cells

2

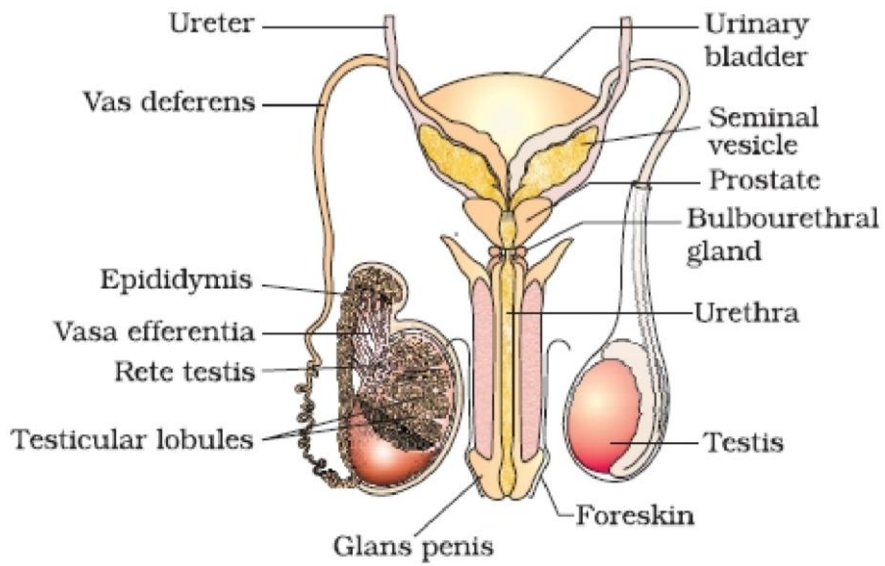


Figure 3.1(b) Diagrammatic view of male reproductive system

3

1. b
2. c
3. d
4. a

4

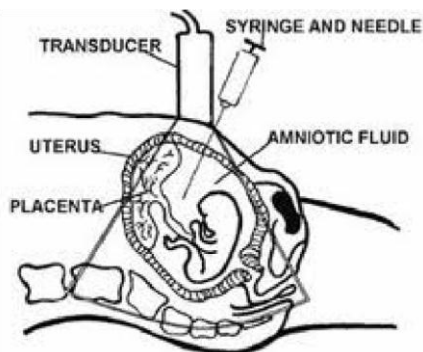
1. Penis
2. seminal plasma
3. foreskin

Work Sheet: 4-A

Chapter No. 4

Topic: Infertility & Amniocentesis

1 Identify the following process.



2 Write the full forms of the following ART, IVF, ZIFT, IUT

3 Answer in one word or sentence: 1. Artificial Insemination

2. In vitro fertilization:

4	Match the following	
	A	B
	Syphilis	Herpes simplex virus
	Genital Herpes	Neisseria gonorrhoeae
	Gonorrhoea	Trichomonas vaginalis
	Trichomoniasis	Treponima pallidum

5 Fill up the blanks:
MTPs are legalized in India in _____.

ANSWERS

1 ANS: amniocentesis

2 ART: Assisted Reproductive Technologies, IVF: in vitro fertilization, ZIFT: Zygote Intra Fallopan transfer, IUT: Intra Uterine Transfer

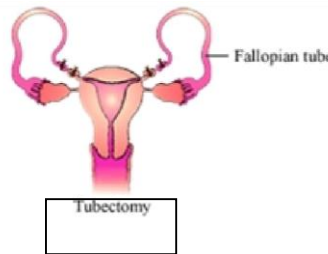
3 1. Semen is collected from husband or donor male and introduced into the vagina or uterus.
3. Sperm and ovum are allowed to fuse under simulated conditions in the laboratory to form zygote.

4	Syphilis	Treponima pallidum	Herpes simplex virus
	Genital Herpes	Herpes simplex virus	
	Gonorrhoea	Neisseria gonorrhoeae	
	Trichomoniasis	Trichomonas vaginalis	

5 1971

Work Sheet: 4-B	Chapter No. 1	Topic: Methods Of Birth Control	
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1 Name the following birth control method?



2 **Match the following:**

A	B
1. Saheli A.	IUD
2. Cu-7 B.	Barrier Method
3. Cervical Cap C.	Implant
4. Norplant D.	Oral Contraceptive

3	Fill in the blanks: a) Oral contraceptive pills are to be taken for a period of ____ days. b) _____ is an example of hormone releasing IUD. c) A contraceptive that can prevent STDs is _____
4	State True or False 1. Periodic abstinence is always a reliable method of birth control. <input type="text"/> 2. Saheli is a once a week pill <input type="text"/> 3. Testosterone and progesterone mixture is used in contraceptive injection & implants. <input type="text"/>
5	When is MTP safe?

ANSWERS

1	Tubectomy	
2	Saheli	D. Oral Contraceptive
	Cu-7	A. IUD
	Cervical Cap	B. Barrier Method
	Norplant	C. Implant
3	1. 21	
	2. LNG-20 OR PROGESTESERT	
	3. CONDOM	
4	1. FALSE	
	2. TRUE	
	3. FALSE.	
5	. During the first trimester i.e., upto 12 weeks of pregnancy	

Work Sheet: 5-A	Chapter No. 5	Topic: Mendelism	Kolkata Region
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1	There is no glycoprotein on RBC s in persons with blood group O .Give reason. <hr/> <hr/>
2	_____ number of phenotypes are formed in the 16 squares in a punett square of a dihybrid cross.

3	On self pollination of a tall pea plant , it was found that one fourth of the progeny were dwarf .What is the genotype of the parent and the dwarf progenies ?
4	Which law of Mendel was strongly opposed by the concept of Linked genes.
5	All test crosses are Back crosses but all Back crosses are not Test crosses .Why ?

ANSWERS

1	There is no dominant gene that codes for glycoproteins on RBC s in blood group O.
2	Four
3	Parent - Tt , Dwarf progeny - tt
4	Law of Independent Assortment
5	In a test cross, only recessive parent is used whereas in back cross it is not so.

Work Sheet:

5-B

Chapter

No. 5

Topic:

Linkage and Genetic disorders

Kolkata Region

1 X- chromosome is called sex chromosome. Why?

2 Certain genes tend to be inherited together in a cell at the time of cell division due to

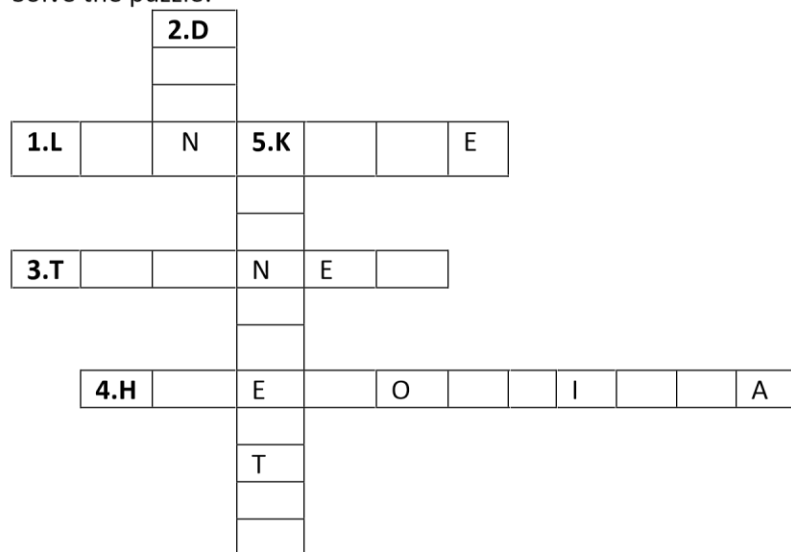
3 _____ used the frequency of recombination between gene pairs on the same chromosome as a measure of the distance between genes.

- (1) Morgan (2) Sutton and Boveri
(3) Mendel (4) Sturtevant

4 Human male never passes the gene for Haemophilia to his son. Why ?

- (a) The gene is Y-linked (b) Autosomal recessive
(c) Autosomal dominant (d) X linked

5 Solve the puzzle:



Across –

- 1. Physical association of genes on a chromosome.
- 3. Absence of one X chromosome (syndrome).
- 4. sex linked recessive disease.

Down—

- 2. trisomy of 21st chromosome (syndrome).
- 5. Extra copy of X chromosome (syndrome).



ANSWERS

- 1 X chromosome is used in the determination of sex of individual.
- 2 Linkage
- 3 (4) Sturtevant
- 4 (d) X linked
- 5 1. LINKAGE , 2.DOWN , 3.TURNER , 4.HAEMOPHILIA , 5. KLINEFELTER

Work Sheet: 6-A	Chapter No. 6	Topic: DNA and RNA	Kolkata Region
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1 | What is the role of DNA ligase in replication ?

2 |

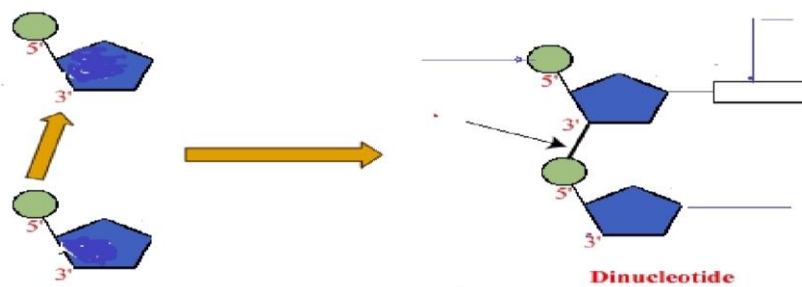
a

b

d

c

Polynucleotide formation



Label a, b, c and d in the above diagram .

3

_____ is the initiation factor for transcription of a segment of DNA into RNA.

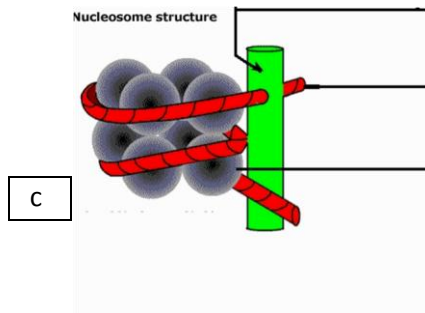
(a) Rho factor (b) RNA primer

(c) sigma factor (d) DNA polymerase

4 Label a, b, and c in the following diagram :

a

b



5. State any 4 features of the Genetic code .

ANSWERS

- 1 To join Okazaki fragments
- 2 . (a) Phosphate, (b) Phosphodiester bond , (c) Nitrogen base ,(d) Deoxyribose sugar
- 3 (c) Sigma factor
- 4 (a) H 1 Histone ,(b) DNA ,(c) Histone octamer.
- 5 Code is , degenerate, mbiguous, non –overlapping.
universal una

Work Sheet:
6-B

Chapter
No. 6

Topic:
Molecular Basis of Inheritance

KOLKATA Region

- 1 Why HGP is called mega project ?
- 2 Draw a diagram of the nucleosome .
- 3 Differentiate between Codon and Anticodon .
- 4 Write the role of ribosome during translation .
- 5 Write about
 - a) promoter
 - b) inducer

ANSWERS

1	Total cost of this project is nine billion US dollars and complited in 13 years.
2	NCERT TEXT BOOK fig no. 6.4 a.

3	Present on mRNA, present on tRNA respectively.
4	Site of translation.
5	a) promote transcription , b) substrate that prevents operator to bind operator.

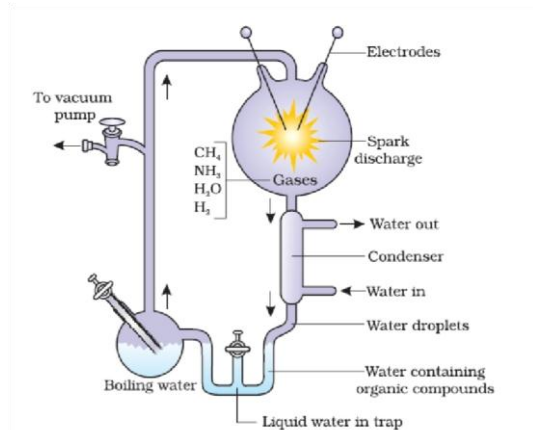
Work Sheet: 6-C	Chapter No. 6	Topic: Molecular basis of Inheritance	Kolkata Region
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- 1 What is satellite DNA ?
- 2 Write full form of VNTR?
- 3 Write the function of DNA POLMERASE.
- 4 Write the name of initiating codon .
- 5 Write the scientific name of the organism on which Taylor.et al performs their experiment.

		ANSWERS
1	A portion of DNA which not code for any protein.	
2	Variable Number Tandem Repeats.	
3	DNA replication	
4	AUG,GUG	
5	<i>Vicia faba</i>	

Work Sheet: 7-A	Chapter No. 7	Topic: Evolution	Ranchi Region
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- 1 Which statement is correct regarding *Biston betularia*
 - a. The black colouration was caused by pollution
 - b. Black moths were covered with soot
 - c. These mothes were killed by a fungus
 - d. An occasional mutation caused black moth to be born.
- 2 Anatomical structures that show similar function, but are dissimilar embryonically are called -----.
- 3 Mention the brain capacity of *Homo habilis*.
- 4 Name the theory that describes the formation of universe.



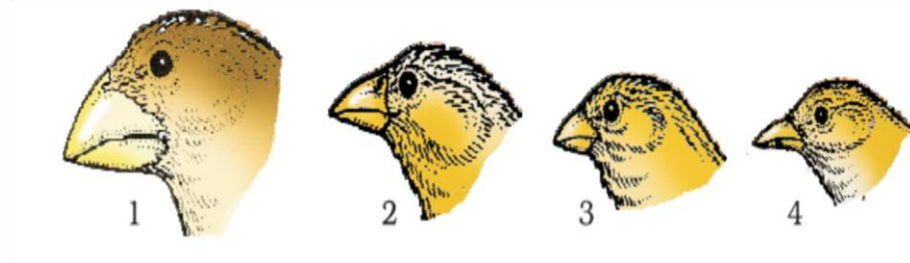
What does this diagram signify?

ANSWERS

- 1 d
- 2 Analogous organs
- 3 650-800cc.
- 4 The Big Bang Theory
- 5 This diagram shows the experimental proof of theory of abiogenesis.

Work Sheet: 7-B	Chapter No.7	Topic: Evolution	Prepared by: Ranchi Region
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1



Write your observation on the variations seen in the Darwin's Finches show

n above.

- 2 Name the five factor affecting Hardy-Weinberg equilibrium.

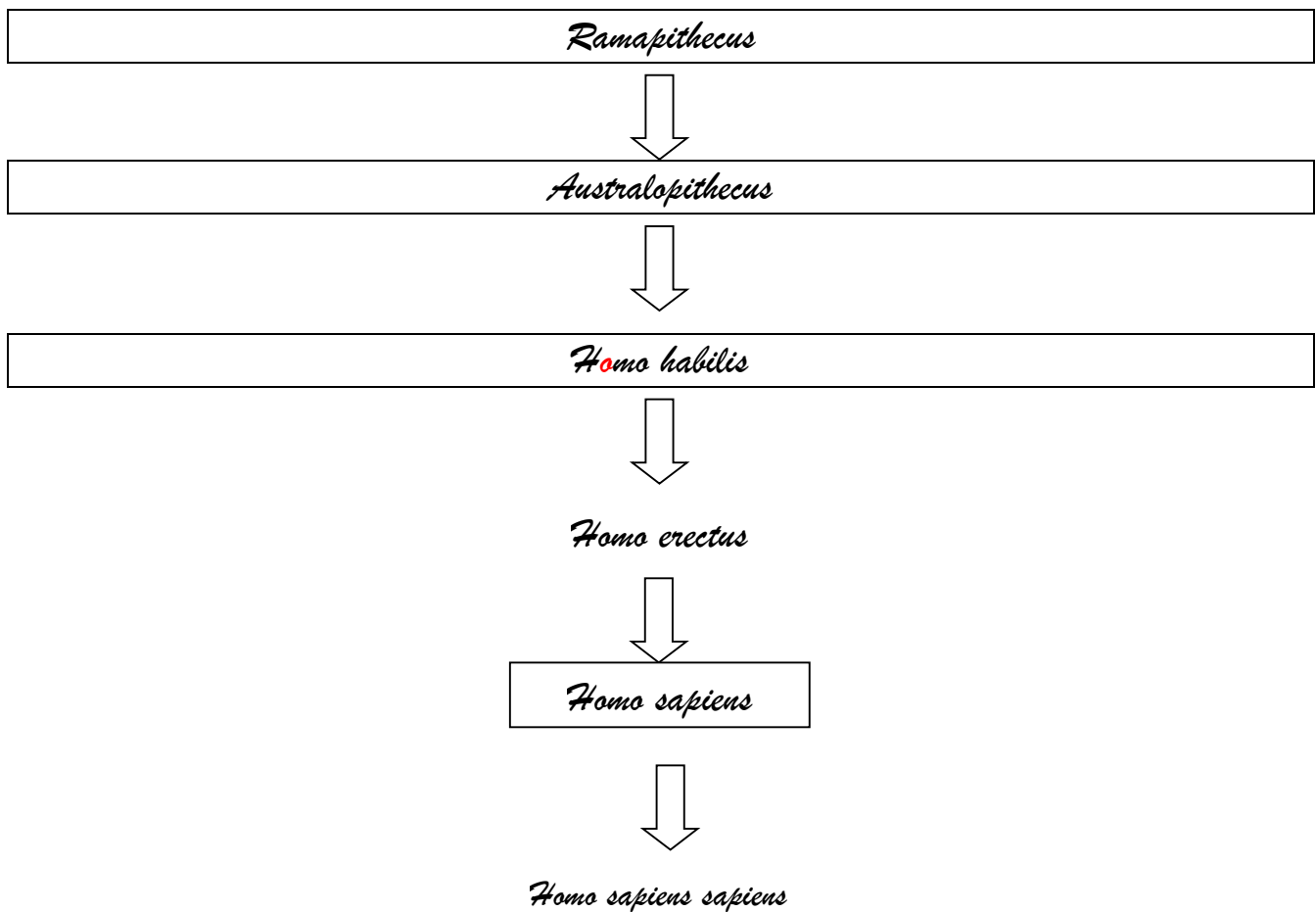
- 3 Make a flow chart to show the Human evolution.
- 4 Name the gases present in the atmosphere of primitive earth.

- 5 Who disproved the theory of spontaneous generation?

ANSWERS

- 1 The variation of beaks is the outcome of adaptation to different food habits.
- 2 Five factors are-1.Gene migration 2.Genetic drift 3.Mutation 4.Genetic recombination 5.Natural selection 3

EVOLUTION OF MAN



(Modern man)

4 Methane, Ammonia, Water vapour and Hydrogen. 5
Louis Pasteur.

Work Sheet:
8-A

Chapter
No. 8

Topic:
Life cycle of Malarial Parasite

Ranchi Region

- 1 How many hosts are required to complete the life cycle of malarial parasite?

- 2 When the infected female Anopheles mosquito bites a healthy man, which stage of the parasite is injected ?

- 3 The parasite enters the liver cells and goes for -----type of reproduction.

- 4 The sexual stages of the parasite develop in ----- cells of human beings.

- 5 The fertilization & development of the parasite take place in which part of the secondary/ intermediate host's body?

- 1 Two hosts(man-primary host& female Anopheles mosquito- secondary host) 2 Sporozoite stage
- 3 Asexual reproduction
- 4 RBC'S
- 5 Intestine

Work Sheet:

8-B

Chapter

No. 8

Topic:

AIDS

Ranchi Region

- 1 Name the group of viruses which causes HIV/AIDS ?
- 2 HIV/AIDS gets spread by touching or through simple physical contact .True/false
- 3 Name the widely used diagnostic test for AIDS.
- 4 What is the full form of NACO ?
- 5 We must use disposable needles and syringes to avoid spreading of HIV . True/false

		ANSWERS
1	Retrovirus	
2	False	
3	ELISA (ENZYME LINKED IMMUNO SORBENT ASSAY)	
4	National AIDS Control Organisation	
5	True	

Work Sheet:

9-A

Chapter

No.9

Topic:

Animal husbandry

Ranchi Region

- 1 What is an animal husbandry?
- 2 Which animals are taken care in the animal husbandry?
- 3 Name any two products of dairy farm?
- 4 Write down the scientific name of the common species of honey bee.
- 5 Whether the birds or honey bees are the major pollinators of flowers?
- 6 Q6.Fill in the blanks:
 - a)Animal husbandry deals with the care and breeding of -----.
 - b)Dairying is the management of animals for -----.
 - c)Poultry is the class of domesticated fowl(birds) used for ----- and -----.
 - d)Controlled breeding experiments are carried out using -----.
 - e)----- is a new breed of sheep developed in Punjab by crossing Bikaneri ewes Marino rams
- 7 Fill in the blanks: A,B,C,D and E.

Crop	Variety	Resistance to diseases
------	---------	------------------------

Wheat	A	Leaf and stripe rust, hill bunt.
Brssica	Pusa swarnim(Karan rai)	B
C	Pusa shubhra, Pusasnowball K-I	Black rot and curl,blight black rot
Cowpea	D	Bacterial blight
E	Pusa sadabahar	Chilly mosaic virus,Tobacco mosaic virus and Leaf curl.

ANSWERS

- 1 Agricultural practice of breeding and raising livestock.
- 2 Livestock like cow, buffaloes,pigs, horses,duck,etc.
- 3 Milk, butter,cheese,etc. 4 Apis indica.
- 5 Honey bees
- 6 a)Livestocks
b)milk
c) egg and meat
d)Artificial insemination
- 7 A-Himgiri,B-White rust,C-Cauliflower,D-Pusa komal,E-Chilli

Work Sheet:

10-A

into curd by lactic acid bacteria is:

Chapter

No. 10

Wastewater treatment generates a large quantity of

Topic:

**MICROBES
IN
HUMAN
WELFARE**

Prepared

**by:
SILCHAR
Region**

1

a.

The vitamin whose content increases following the conversion of milk

sludge, which can

2

be treated by:

- c. chemicals
- d.

- vitamin C
- c. vitamin B 12
- E.
- b. vitamin D
- d. vitamin E.

3

- a. rumen of cattle
- b. gobar gas plant
- c. bottom of water
- d. activated sludge

- a. digesters
- b. activated sludge oxidation pond

Methanogenic bacteria are not found in:

-logged paddy fields

- a) Lactic acid
- b) Butyric acid
- c) Acetic acid

4 products:

Bacterium

- (i) *Aspergillus niger*
- (ii) *Acetobacter aceti*
- (iii) *Clostridium butylicum*
- (iv) *Lactobacillus*

Choose the correct match:

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

Match the following list of bacteria and their commercially important

Product

- (
- (
- (

(d) Citric acid

ect match:

5

- a. dissolved impurities
- b. stable particles
- c. toxic substances
- d. harmful bacteria.

The primary treatment of waste water involves the removal of:

- 1 c 2
 a 3
 c
 4 C
 5 b

Work Sheet:
10-B

Chapter
No. 10

Topic:
MICROBES IN HUMAN WELFARE

SILCHAR Region

- 1 BOD of waste water is estimated by measuring the amount of:
 - a. total organic matter
 - b. biodegradable organic matter
 - c. oxygen evolution
 - d. oxygen consumption.
- 2 Which one of the following alcoholic drinks is produced without distillation?
 - a. Wine
 - b. Whisky
 - c. Rum
 - d. Brandy
- 3 The technology of biogas production from cow dung was developed in India largely due to the efforts of:
 - a. Gas Authority of India
 - b. Oil and Natural Gas Commission
 - c. Indian Agricultural Research Institute and Khadi & Village Industries Commission
 - d. Indian Oil Corporation.
- 4 The free-living fungus *Trichoderma* can be used for:
 - a. killing insects
 - b. biological control of plant diseases
 - c. controlling butterfly caterpillars
 - d. producing antibiotics
- 5 Match the items in Column 'A' and Column 'B' and choose correct answer.

Column A	Column B
(i) Lady bird	(a) Methano bacterium
(ii) Mycorrhiza	(b) Trichoderma
(iii) Biological control	(c) Aphids
	(iv) Biogas
	(d) Glomus

The correct answer is:

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

ANSWERS

- 1 D 2
 A 3

C 4

b

5 b

Work Sheet:
10-C

Chapter
No. 10

Topic: microbes in
human hold products

Region Silchar

- 1 Name microbes known as “baker’s yeast”.
- 2 Why there are large holes in “Swiss cheese”. Name the bacteria responsible for it?
- 3 Full form of LAB.
- 4 What is “toddy”? How is it prepared?
- 5 Name the microbes used to convert milk into curd. How its quality is improved?

ANSWERS

- 1 *Saccharomyces cerevisiae*.
- 2 Due to production of carbon dioxide. *Propionibacterium sharmanii*
3 Lactic acid bacteria.
- 4 South Indian traditional drink made by fermenting sap from palms.
- 5 Lactobillus.by increasing vitamin B12 .

Work Sheet: 11-
A

Chapter
No. 11

Topic:
Restriction Enzymes

- 1 Name the Enzyme that cuts at specific position within the DNA.
 - a) Restriction Endonuclease.
 - b) Restriction Exonuclease.
 - c)DNA ligase
 - d) None of the above.

2



Name the Enzyme that makes the above cut.

- a) BamH I
- b) EcoR I
- c) Hind III
- d) None of the above.

- 3
- a) DNA ligase enzyme joins the sticky ends to form recombinant DNA. True/False.
 - b) DNA fragments are separated and isolated by gel electrophoresis technique. True/False
 - c) We need Ethidium bromide to stain the separated DNA fragments in gel electrophoresis.

True/False

4 Match the following:-

Column-A	Column-B
a) Restriction Endonuclease	i) ADA deficiency(SCID)
b) Gene Therapy	ii) EcoRI
c) Gel electrophoresis	iii) Amp-r & tet-r
d) Selectable Marker	iv) Separation of DNA fragments according to their length

- 5
- a) We need _____ to stain the separated DNA fragments in gel electrophoresis. Ethidium bromide/ Ethidium iodide/ Ethidium chloride.
 - b) Source of Ti Plasmid is _____. *Agrobacterium tumifaciens*/E. coli/
Salmonella typhimurium/*Thermos aquaticus*

ANSWERS

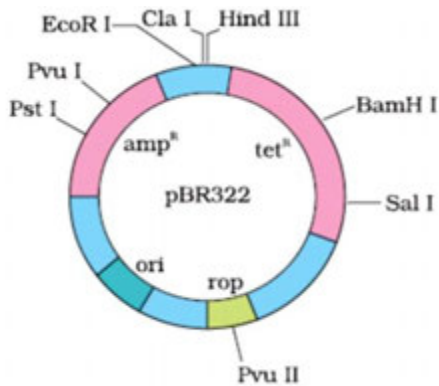
- 1 Restriction Endonucleases.
- 2 EcoRI
- 3 a) True
b) True
c) True

4

Column-A	Column-B
a) Restriction Endonuclease	ii) EcoRI
b) Gene Therapy	i) ADA deficiency(SCID)
c) Gel electrophoresis	iv) Separation of DNA fragments according to their length
d) Selectable Marker	iii) Amp-r & tet-r

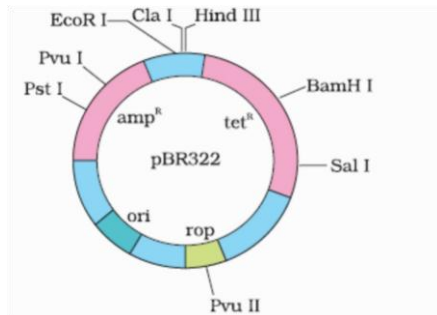
- 5 a) Ethidium bromide .b) *Agrobacterium tumifaciens*

1 amp^r and tet^r represents _____ . (Selective Marker/Permanent marker)?



2

Name two Restriction Endonucleases which will cut the plasmid at specific sequence .



3 a) Beta -galactosidase enzyme sequence is used in insertional inactivation method. True/False

b) Ori sequence is also responsible for controlling the copy number of the linked DNA. True/False

c) Bacteria is one of the source of plasmid. True/False

4 Which bacterium provides us Ti plasmid?

a) *Agrobacterium tumefaciens*

b) *E. coli*

c) *Salmonella typhimurium*

d) None of the above

5 a) Disarmed Retroviruses are used to deliver genes in _____ . (Animals/Plants/Bacteria)

b) Chitinase removes the cell wall of _____ . (Fungus/Bacteria/Animals)

c) Replication in plasmid vector starts from _____ . (Ori/rop/regulator/inhibitor)

- 1 Selective Marker
- 2 EcoRI and BamHI
- 3 a)True
b)True
c)True
- 4 *Agrobacterioum tumifaciens*
- 5 a)Animals b)Fungus c)Ori

Work Sheet: 11-
C

Chapter
No. 11

Topic:
Processes of recombianant DNA
Technology

Prepared by:

- 1 Which enzyme is used to break the cell wall of bacteria?
 - a)Cellulase
 - b)Lysozyme
 - c)Chitinase
 - d)None of the above
- 2 a)Taq polymerase is the enzyme used in PCR for DNA polymerization.True/False
b)Taq polymerase can work at higher temperature(Thermostable).True/False
c) Taq Polymerase is an archaebacteria present in hot spring. True/False
d)The stirrer facilitates mixing and oxygen availability throughout the bioreactor. True/False 3

Which instrument is used to culture large volume of bacteria? Nuclear reactor/Bio reactor 4

Mention in which process primers are annealed to DNA in a Polymerase chain reaction?

- 5 The processes of separation and purificationof product from bioreactor are collectively known as _____.
 - a)Down stream processing
 - b)Upstream processing
 - c)cleaning of bio-reactor
 - d) Washing of Product.

- 1 Cellulase.
- 2 a)True
b)True
c)True

d) True 3

Bioreactor.

- 4 The stirrer facilitates even mixing and oxygen availability throughout the bioreactor. True
- 5 Downstream processing.

Work Sheet: 12- A	Chapter No. 12	Topic: Biotechnological Applications in Agriculture
----------------------	-------------------	---

- 1 Expand GMO.
 - a) Genetically Modified Organisms
 - b) Genetically Modified Ovary
 - c) Genetically Modified Orchid
 - d) None of the above

- 2 Expand Bt.
 - a) Biotechnology
 - b) *Bacillus thuringiensis*
 - c) *Brinjal Technology*
 - d) *None of The Above*

- 3 A nematode *Meloidegryne incognitia* infects the roots of _____ plants and causes a great reduction in yield.
Tobacco /Cotton /Brinjal.

- 4 Prototoxin is converted into an active form of toxin due to the alkaline pH of the gut which solubilise the crystals. The activated toxin binds to the surface of midgut epithelial cells and create pores that cause cell swelling and lysis and eventually cause death of the insect. True/False
- 5 RNAi takes place in all _____ organisms as a method of cellular defense. (Eukaryotic / Prokaryotic).

ANSWERS

- 1 Genetically Modified Organisms (GMO).
- 2 *Bacillus thuringiensis*
- 3 Tobacco.
- 4 Prototoxin is converted into an active form of toxin due to the alkaline pH of the gut which solubilise the crystals. The activated toxin binds to the surface of midgut epithelial cells and create pores that cause cell swelling and lysis and eventually cause death of the insect. True

5 Eukaryotic.

**Work Sheet:
12B**

**Chapter
No. 12**

**Topic: BIOTECHNOLOGICAL
APPLICATIONS IN MEDICINE**

- 1 Pro-insulin is A,B &C polypeptides and Insulin is A&B Polypeptides joined by disulfide bonds.True/false
- 2 What is the difference between Pro-insulin and insulin?
- 3 Expand ADA.
- 4 Expand ELISA.
- 5 ELISA is based on the principle of antigen-antibody interaction.True/False

ANSWERS

- 1 True
- 2 **C -peptide.**
- 3 Adenosine deaminase.
- 4 Enzyme Linked Immuno-sorbent Assay.
- 5 True.

Work Sheet: 12-C

**Chapter
No.12**

**Topic: BIOTECHNOLOGICAL
APPLICATIONS IN MEDICINE**

- 1 GEAC stands for.

a)Ground Environment Action Committee
b)Genetic Engineering Appraisal Committee
c)Genetic Engineering Approval Committee
d)Genetic and Environment Approval committee
- 2 ADA deficiency can be cured by clinical gene therapy. True/False
- 3 The milk Produced by Rosie Cow was rich in _____ Protein.

Alpha-lactalbumin / Alpha-1-antitrypsin / Haemoglobin / Collagen.
- 4 Match the Following:-
a)First clinical gene therapy i)Humilin
b)Eli Lilly ii)Rosie
c)The First Transgenic Cow iii)HIV test

d)ELISA

iv)SCID(ADA deficiency)

- 5 **GEAC** (Genetic Engineering Approval Committee), which will make decisions regarding the validity of GM research and the safety of introducing GM-organisms for public services. True/False

ANSWERS

- 1 b)Genetic Engineering Approval Committee
2 True
3 Alpha-lactalbumin
4 a)First clinical gene therapy iv)SCID(ADA deficiency)
b)Eli Lilly i)Humilin
c)The First Transgenic Cow ii)Rosie
d)ELISA iii)HIV test
5 True

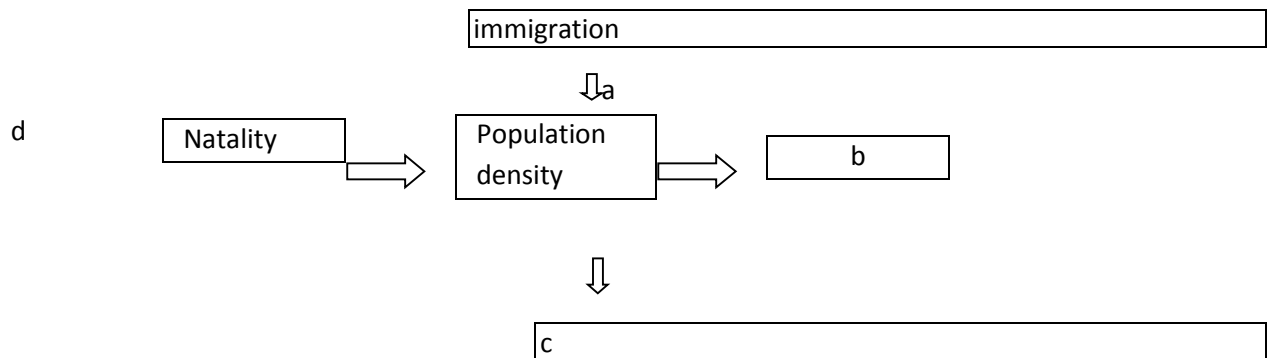
Work Sheet:
13-A

Chapter
No. 13

Topic:
Population Attributes

1

Replace the letters a,b,c & d by appropriate words:



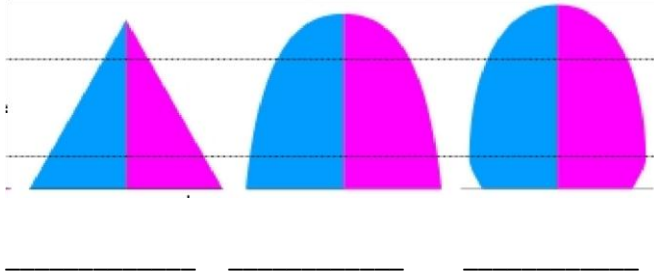
2

Name the three ecological age groups.

Name then two factors that contribute to an increase in population size/density.

3

Identify the age pyramids:



- 4 Fill up the blanks:
- When the resources are unlimited the population growth exhibits _____ growth model.
 - Organisms like _____ and _____ breed once in their life time.
 - Every habitat has resources to support a particular maximum number of individuals called _____
- 5 What do the following equations represent:
- $dN/dt = (b-d) \times N$ _____
 - $dN/dt = rN \times (k-N)/k$ _____

ANSWERS

- Mortality
 - emigration
- Pre reproductive, reproductive, post reproductive ,
 - food availability, weather, predation pressure, competition. (any two)
- Expanding, stable, declining
- exponential
 - pacific salmon fish, bamboo
 - carrying capacity
- exponential growth
 - logistic growth

Work Sheet:
13B

Chapter
No. 13

Topic:

1

Complete the following table with + or - :

Name of the interaction	Species A	Species B
Mutualism		
Predation		
Parasitism		
commensalism		

2

Identify the true statements:

1. Fungus absorbs the nutrients , whreas algae prepares food in Lichen.
2. A true parasite kills its host.
3. Prey kills the predator and absorbs the nutrients.
4. Orchids grow as epiphytes. This is an example of commensalism.

3 Pick the ectoparasites from the following list:

- a) Tapeworm,
- b) plasmodium
- c) lice
- d) liverfluke

4

Fill up the blanks:

1. Competition is _____ to both the species.
2. Cuckoo bird is _____ parasite.
3. Mycorrhiza is an example of _____.

5 Name a parasitic plant.

ANSWERS

1	Name of the interaction	Species A	Species B
	Mutualism	+	+
	Predation	+	-
	Parasitism	+	-
	commensalism	+	0

- 2
1. True
 2. false
 3. true
 4. true

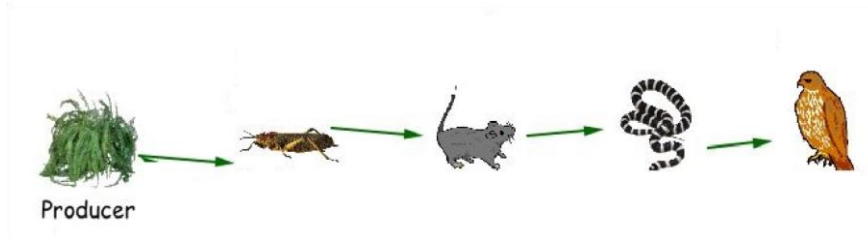
3 c. lice

- 4
1. Harmful
 2. brood
 3. mutualism

5 Cuscuta

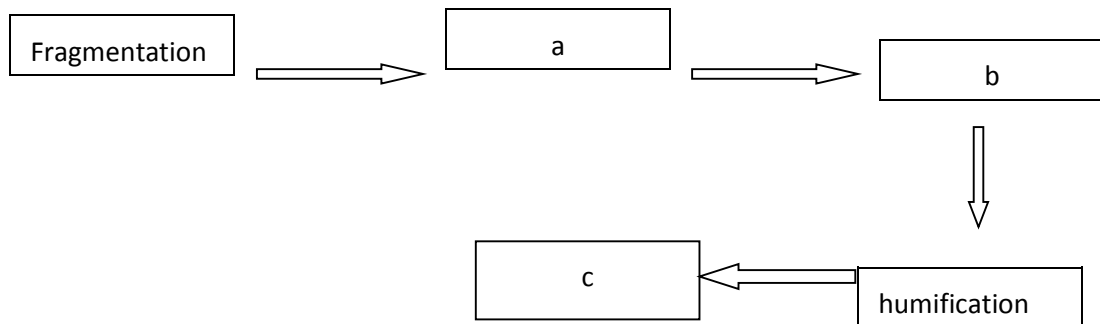
1

Identify the trophic levels from the following food chain



- a) Grasshopper _____
 b) Eagle _____
 c) Snake _____

2 Write down the blank steps a, b, & c



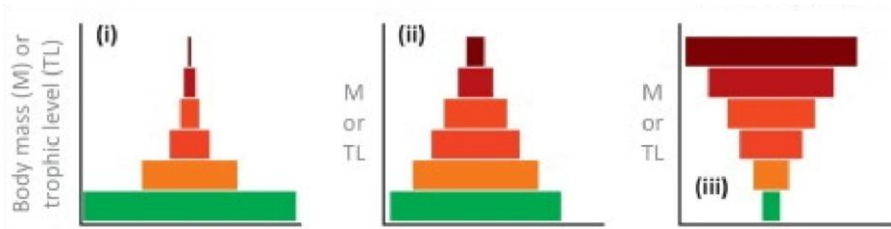
3 Pick the correct option:

1. In an ecosystem the cycling of nutrient is known as
 - a) Geological cycle
 - b) Geochemical cycle
 - c) Chemical cycle
 - d) Biogeochemical cycle

2. Mass of living matter at a trophic level in an area at any time is called as
 - a) Standing crop
 - b) Detritus
 - c) Humus
 - d) Standing state

4

Which of the following can not be pyramid of energy?



5 Classify the following components of ecosystem as biotic and abiotic:
Human, fire, tiger, mushroom, rainfall, soil, phytoplanktons, diatoms

ANSWERS

Biotic	Abiotic

- 1 a. producer, b. quaternary consumer, c. tertiary consumer
- 2 a. leaching, b. catabolism, c. mineralisation
- 3 a. standing crop

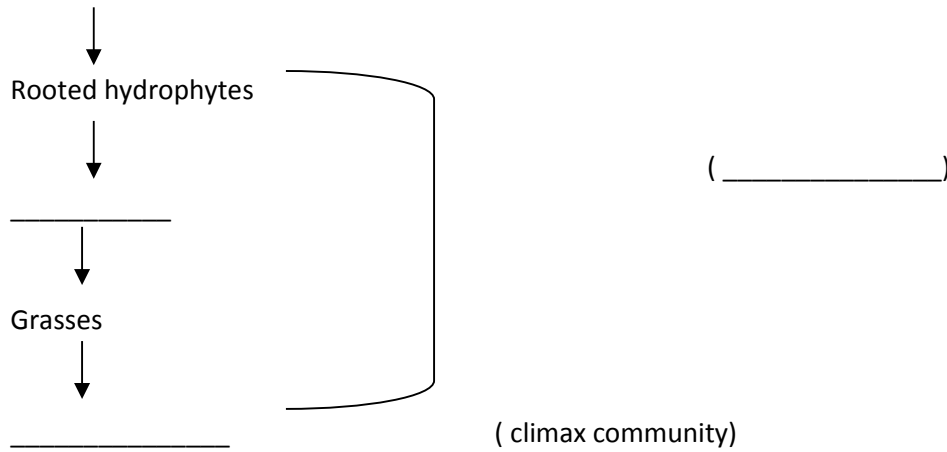
Biotic	Abiotic
Human, tiger , mushroom, phytoplanktons, diatoms	Fire, rainfall , soil

- 4 (iii)
- 5

Work Sheet: 14B Chapter No. 14 Topic: Ecological Succession And Nutrient Cycling

1 Complete the following flow chart:





2 Choose the correct option:

1. About 70% of total global carbon is found in:

- a) Ocean
- b) Forest
- c) Grassland
- d) Agro ecosystems

2. Which of the following fixes atmospheric nitrogen:

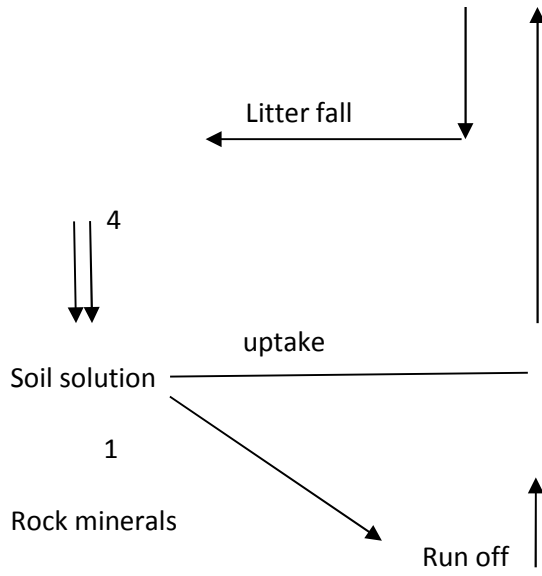
- a) Nostoc
- b) Algae
- c) Methanogens
- d) None of these

3 **State true or false:**

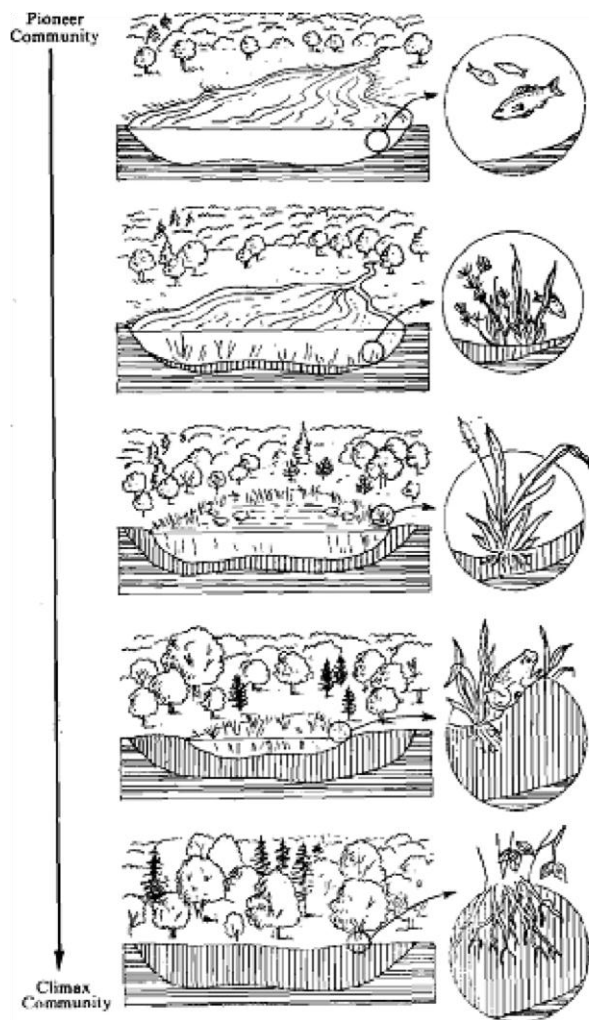
- 1. About 80% dry weight of organisms is constituted by carbon
- 2. Lichens are the pioneer community in a xerarch
- 3. The reservoir for phosphorous cycle exists in atmosphere
- 4. Carbon cycling occurs through atmosphere, oceans and living organisms.
- 5. Hydrarch succession takes place in Himalayan region.

4 A schematic representation of a nutrient cycling is given below. Name the nutrient that is cycled. Indicate what the numbers 1, 2, 3 and 4 represent?





5 Identify the ecological succession given following:



- 1
- 2 1. Ans. a. ocean
2. a. Nostoc
- 3 1. False
2. true
3. false
4. true
5. false
- 4 1. Weathering, 2. Producers, 3. Detritus, 4. Decomposition
- 5 Hydrarch

Work Sheet:

15-A

Chapter

No. 15

Topic:

Biodiversity conservation

- 1 Match the following:
 - (a)Endemism-(i)Khasi and Jaintia hills Meghlaya
 - (b)Hotspot of India- (ii)Zoological Parks and Botanical garden
 - (c)Sacred groves-(iii)Westen Ghats
 - (d)Protection under special care ex – situ type-(iv) Advanced ex situ conservation
 - (e)Cryopreservation – (v)Species found in particular area only.
 Choose the correct match:

A.(a)-(v) ,(b)- (iii),(c)-(i) ,(d)-(ii) ,(e)– (iv)	B.(a)-(iv) ,(b)- (iii),(c)-(i) ,(d)-(ii) ,(e)– (v) C.(a)-(v) ,(b)- (iii),(c)-(ii) ,(d)-(i) ,(e)– (iv)
	D.(a)-(iv) ,(b)- (ii),(c)-(i) ,(d)-(iii) ,(e)– (v)
- 2 Choose the correct answer:
 1. Conserving biodiversity for direct economic benefits like food, medicine, industrial products.
 - (a)Narrowly utilitarian(b)Broadly utilitarian(c)ethical
 2. Conserving biodiversity for major ecosystem services.
 - (a)Narrowly utilitarian(b)Broadly utilitarian(c)ethical
 3. Conserving biodiversity for the Philosophically or spiritually need to realize that every species has an intrinsic value and a moral duty to pass our biological legacy in good order to future generation.
 - (a) Narrowly utilitarian (b) Broadly utilitarian (c)ethical
- 3 Fill in the blanks:
 - 1.The process of exploring molecular genetics and species – level diversity for products of economic importance is known as _____
 2. _____ forest is estimated to produce, through photosynthesis, 20 per cent of the total oxygen in the earth’s atmosphere.
 3. The total number of biodiversity hotspots in the world is _____.
 4. In India, ecologically unique and biodiversity –rich regions are legally protected as _____, _____ and sanctuaries.
 5. The historic Convention on Biological Biodiversity called _____ was held in Rio de Janeiro in 1992.
- 4 Give on word answer:

1. Providing food, medicine, timber, oxygen, helping in pollination giving aesthetic pleasure are some _____ services.
2. The desired approach to save an endangered or threatened animal or plant in natural habitat is _____ type conservation.
3. All biodiversity hot spots put together cover less than ____ percent of the earth's land area .
4. Tissue culture, seed banks are some advanced _____ conservation techniques.
5. _____ Summit on Sustainable development held in 2002 Johannesburg, South Africa is committed to reduce the loss of biodiversity at global , regional and national levels.

5 Write True and False

1. The World Summit was followed by Earth Summit.
2. There are 25 hotspots in the world.
3. Zoological parks, Botanical garden are some ex-situ conservation measures.
4. It is our moral duty to conserve our biodiversity and pass on our biological legacy in good order to future generation.
5. Western Ghats , Sri Lanka , Indo –Burma and Himalaya cover our country'.

ANSWERS

- 1 Match the following:
A.(a)-(v) ,(b)- (iii),(c)-(i) ,(d)-(ii) ,(e)– (iv)
- 2 Choose the correct answer:
 1. (a)Narrowly utilitarian
 - 2 (b)Broadly utilitarian
 3. (c)ethical
- 3 Fill in the blanks:
 1. Bioprospecting 2.
Amazon
 3. 34.
 4. Biosphere reserve, national park 5.
The Earth Summit.
- 4 Give on word answer:
 - 1.ecosystem
 - 2.in-situ
 - 3.2
 - 4.ex-situ
 - 5.World

- 5 Write True or False
1. False
 2. False
 3. True
 4. True
 5. True

Work Sheet: 15-B	Chapter No. 15	Topic: Loss of Biodiversity	
-----------------------------	---------------------------	--	--

- 1 Fill in the blank
 - (i) -----is known as the Lungs of the planet.
 - (ii) Large mammals needing large territories are badly affected by -----.
 - (iii) According to IUCN Red List (2004) -----species were extinct.
 - (iv) -----species are facing treat of extinction worldwide.
 - (v) Indigenous catfishes in India are threatened due to introduction of -----.
- 2 Match the following

(a) Less solar energy	i) Environmental damage and treat to native species
(b) Overexploitation by humans	ii) Decline in plant production
(c) Introduction of Nile Perch in Lake Victoria	iii) Extinction of more than 2000 species of native birds.
(d) Colonization of Tropical Pacific Islands	iv) Extinction of Cichlid fish
(e) Introduction of water hyacinth in India	v) Extinction of Passenger pigeon
- 3 Choose the correct answer
 1. Present rate of Sixth Extinction which is in progress now is
 - a) 100 to 1000 times b) 50 to 100 times c) 100 to 1000 times d) 1 to 10 times
 2. Percentage of gymnosperm species which are in the threat of extinction is
 - a) 50 b) 29 c) 31 d) 23
 3. In the last twenty years , the number of species extinct are
 - a) 56 b) 27 c) 43 d) 87
 4. Extinction of Stellar's sea cow is due to
 - a) Alien species invasions b) co extinction c) Over exploitation d) habitat loss
- 4 Write true or false
 1. Loss of biodiversity lowered resistance to environmental perturbations like drought. 2. Increased variability in pest and disease cycles is due to conservation of biodiversity
 3. Human activities are the main causes of present Sixth extinction.
 4. 12 per cent of all amphibian species in the world are facing treat of extinction.
 5. When a host fish species become extinct, its associated parasite also become extinct.
- 5 Answer in one word or one sentence
 1. The percentage of mammal species which are facing the threat of extinction.

2. The term used when a species becomes extinct, the plant or the animals associated with it in an obligatory way also become extinct.
3. When are migratory birds requiring large territories are badly affected leading to their decline in population?
4. If the present trend of extinction continues, how many species will get extinct within the next 100 years?
5. The number of extinct vertebrates listed in IUCN Red list (2004).

ANSWERS

- 1 Amazon Rain forest; Habitat fragmentation; 784; 15,500 ; African catfish(*Clarias gariepinus*)
2 a-ii; b- v; c- iv; d-iii; c-i
- 3 1. a 2. C 3. b 4. c
- 4 1. False 2. False 3. True 4. False 5. True
- 5 1. 23 2. Co-extinction 3. Habitat fragmentation 4. Half of all the species 5. 338

Work Sheet:
16-A

Chapter
No. 16

Topic:
Air pollution and its control

Region silchar

- 1 Full form of CPCB?
- 2 Name the metals used as catalytic converters in automobiles?
- 3 Which type of fuel should be used in vehicles equipped with catalytic converters?
- 4 According to CPCB, particulate size _____ or less in diameter are responsible for causing the greatest harm to human health.
- 5 Catalytic convertor ,convert unburnt hydrocarbons into __
 - a) Carbon dioxide
 - b) Carbon mono oxide
 - c) Sulpur dioxide
 - d) hydrogen

ANSWERS

- 1 Central pollution control board.
- 2 Platinum-palladium and rhodium
- 3 Unlead petrol
- 4 2.5 micrometers
- 5 Carbon di oxide

Work Sheet: 16-
B

Chapter
No. 16

Topic:
air pollution and its control

- 1 Which part of the atmosphere contains ozone layer?
- 2 What is CFCs?

- 3 How thickness of the the ozone in a column of air is measured?
- DU
 - Kg
 - Litre
 - kilocalorie
- 4 Which radiation is responsible for the snow-blindness?
- 5 Name the radiation responsible for the formation of ozone?

ANSWERS

- stratosphere
- chlorofluorocarbons
- DU(Dobson units)
- UV-B radiation
- Uv radiation

Work Sheet:
16-B

Chapter
No. 16

Topic:
ENVIRONMENTAL ISSUES

Region silchar

- Full form of :-
 - CPCB
 - JFM
 - CFCs
 - DU
 - FOAM
- Choose the correct answer:-
The metals used as catalytic converters in automobiles is1)
platinum-palladium and rhodium
 - platinum-cadmium
 - cadmium –uranium
 - platinum-rhodium

2) Catalytic convertor ,convert unburnt hydrocarbons into__

 - Carbon dioxide
 - Carbon mono oxide
 - Sulpur dioxide
 - hydrogen
- Which type of fuel should be used in vehicles equipped with catalytic converters?answer in one word.
- According to CPCB,particulate size _____ or less in diameter are responsible for causing the greatest harm to human health.
 - The blends of polybend and -----, when used to lay roads,enchanced water repellent properties.

- 3) ----- and ----- commonly known as green house gases.
- 4) Water hyacinth is also known as -----.
- 5) A ----- can remove gases like sulphur dioxide, when exhaust is passed through a spray of water or lime.

5 Match the following:-

Column A

column B

- | | |
|--|---------|
| 1) CNG buses in Delhi | 1) 1981 |
| 2) Air (prevention and control of pollution) act | 2) 1974 |
| 3) Environment (protection) act | 3) 1989 |
| 4) Montreal protocol | 4) 2002 |
| 5) Chipko movement | 5) 1986 |

ANSWERS

- 1
 1. Central pollution control board.
 2. Joint forest management.
 3. Dobson unit.
 4. Chloro fluorocarbons
 5. Friends Of the Arcata Marsh.
- 2
 - 1) Platinum-palladium and rhodium
 - 2) Carbon dioxide
- 3
 - Unlead petrol
- 4
 - 1) 2.5 micrometers
 - 2) Bitumen
 - 3) Carbon dioxide and methane
 - 4) Terror of Bengal
 - 5) scrubber
- 5
 - 1---2002, 2—1981, 3—1986, 4—1989, 5—1974.

Work Sheet:

16-C

Chapter

No.16

Topic:

ENVIRONMENTAL ISSUES

SILCHAR Region

1

Choose the correct answer:-

Which part of the atmosphere contain ozone layer1)

Stratosphere

2) Troposphere

3) Exosphere

4) Ionosphere

2) Thickness of the the ozone in a column of air is measured?

a) DU

b) armstrong

c) micrometre

d) kilocalorie

2 Match the following:-

Column A

column B

- | | |
|-------------------------------|--------------------------------|
| 1) DDT | a) eutrophication |
| 2) BOD | b) level of water pollution |
| 3) algal bloom | c) removing particulate matter |
| 4) CNG | d) biomagnification |
| 5) electrostatic precipitator | e) efficient fuel |

3

Fill in the blanks-

- 1) formation of a large area of thinned ozone layer, commonly called as the -----.
- 2) ----- can remove over 99% particulate matter present in the exhaust from a thermal power plant.
- 3) Euro II norms stipulates that ----- be controlled at 350 ppm in ----- and 150 ppm in-----.

4 Name the radiation responsible for1)

Snow blindness

2) Formation of ozone

5 Name the world's most problematic aquatic weed.

ANSWERS

1 1) Stratosphere

2) DU(Dobson

units) 2 1---d, 2---b, 3---a, 4---e,

5---c.

3 1) Ozone hole

2) Electrostatic precipitator

3) Sulphur, diesel and petrol

4 1) UV-B radiation 2) Uv radiation

5 *Eichhornia crassipes*