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Appendices

Appendix-1

EDUCATION DEPARTMENT
GOVERNMENT OF SIKKIM
TASHILING-737103, GANGTOK

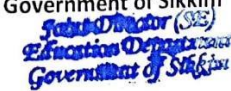Ref No: Loose/GOS/DIR/SE/EDN/2022/153

Dated: 21.09.2022

To,

Ms Kathryn Rai
Research Scholar
Department of Education
Tezpur Central University
Tezpur, Assam-784028

Sub : **Permission to collect data from Class XII Biology Students of Sikkim - reg**

Reference to your letter No. Nil dated: 19.09.2022, with the approval of higher authority you are hereby allowed to visit Senior Secondary Schools of Sikkim to collect data on the topic "Brain hemispheric dominance, metacognitive awareness, perceptual learning styles and academic achievements".

The permission is granted under the following conditions that:-

1. Strict compliance to COVID-19 protocol should be adhered to.
2. Teaching learning hour of the school should not be disturbed.
3. Prior permission of the school head is mandatory.
4. Report of data collected should be used only for research work.

Joint Director (Secondary Education)
Education Department
Government of Sikkim

Copy for information to :-
1. Spl Secy cum Director/SE, Edn Dept., Govt. of Sikkim
2. CEOs (N/E/W/S), Edn Dept., Govt.of Sikkim
3. Concerned HOIs

Name_____Age_____

Phone No._____Gender_____Type of school (Govt/Private)_____

Name of your school_____

Instructions: You are asked to answer all questions. Kindly do not tick on all options. **Tick ✔)** **on either a, b or c.** Your responses shall be kept confidential. They shall be used only for research purpose.

Assessment of Brain Hemispheric Dominance	

1. I prefer the kind of classes
     a. where I listen to an authority.
     b. where I can move around and do things.
     c. where I can listen and also do things.
	2. Concerning guesses or intuitions:
	     a. I would rather not depend on them to help me make important decisions.
	     b. I frequently have strong ones and follow them.
	     c. I occasionally have strong hunches/guesses but usually I do not place much faith in them or consciously follow them.

3. I usually have a way of doing things, and an ability to organize information and materials.
     a. Yes
     b. No
     c. In some areas of my life, but not in others.
	4. When I want to remember directions, a name, or anything important, I usually
	     a. write them down
	     b. visualize the information in my mind
	     c. associate it with previous information in several different ways

5. I write my notes in a notebook or print them when I feel the need.
     a. Never
     b. Frequently
     c. Sometimes
	6. I prefer the kind of classes
	     a. where there is one assignment at a time and I can complete it before beginning the next one.
	     b. where I work on many things at once.
	     c. I am fine with both kinds about equally.

7. When remembering things or thinking about things, I do so best with
     a. words
     b. pictures and images
     c. both equally well
	8. In reviewing instructions, I prefer
	     a. to be told how to do something.
	     b. to be shown how to do it.
	     c. no real preference for demonstration over oral instruction.

9. Do you instinctively feel an issue is right or do you decide on the basis of information? a. I decide on the basis of information. b. I instinctively feel it is right or correct. c. I tend to use a combination of both.	10. I have a. no or almost no mood changes. b. frequent mood changes. c. occasional mood changes.
11. I am a. easily lost in finding directions, especially if I have never been to that place before. b. good at finding my way, even when I have never been in that area. c. not bad in finding directions, but not really good either.	12. I generally a. use time to organize work and personal activities. b. have difficulty in completing personal activities within time limits. c. am able to complete personal activities within time limits easily.
13. I prefer to learn a. details and specific facts. b. from a general overview of things and to look at the whole picture. c. both ways about equally.	14. I learn best from teachers who a. are good at explaining with words. b. are good at explaining with demonstration, movement and/or action. c. doing both equally well.
15. I prefer to solve problems with a. logic b. my gut feelings or instincts c. both logic and gut feelings (instincts)	16. I prefer a. simple problems and solving one thing at a time b. more complicated problems, more than one thing c. both kinds of problems
17. Daydreaming is a. a waste of time b. a usable tool for planning my future c. amusing and relaxing	18. I prefer classes in which I am expected a. to learn things I can use in the future. b. to learn things I can use right away. c. I like both kinds of classes equally.
19. When I am interacting with people a. I do not pay attention to their body language. I prefer to pay attention to what they say. b. I observe their body language and I am good at understanding it. c. I am good at understanding what people say and also in interpreting body language.	20. If I have to choose between algebra and geometry, then I prefer a. Algebra b. Geometry c. I have no real preference of one over the other

21. In preparing myself for a new or difficult task, such as assembling a bicycle, I would most likely
   a. lay out all the parts, count them, gather the necessary tools and follow the directions
   b. glance at the diagram and begin with whatever tools were there, sensing how the parts fit
   c. recall past experiences in similar situations
	22. While communicating with others, I am more comfortable being the
	   a. Talker
	   b. Listener
	   c. I am usually equally comfortable with both

23. I can tell fairly accurately how much time has passed without looking at a clock
   a. Yes
   b. No
   c. Sometimes
	24. I like my classes or work to be
	   a. planned so that I know exactly what to do
	   b. open with opportunities for change as I go along
	   c. both planned and open to change

25. I prefer
   a. multiple-choice tests
   b. essay tests
   c. I like both kinds of tests equally
	26. While studying, I prefer
	   a. taking ideas apart and thinking about them separately
	   b. putting a lot of ideas together before applying them to my life
	   c. both equally

27. When I read, I prefer to look for
   a. specific details and facts
   b. main ideas
   c. both about equally
	28. I enjoy
	   a. talking and writing
	   b. drawing and handling things
	   c. both equally

29. It is more exciting to
   a. improve something
   b. invent something
   c. both are exciting to me
	30. I am skilled in
	   a. putting ideas in a logical order
	   b. showing relationships among ideas
	   c. both equally

31. I am good at
   a. recalling verbal material (names, dates)
   b. recalling visual material (diagrams, maps)
   c. equally good at both
	32. I remember faces easily
	   a. Yes
	   b. No
	   c. Sometimes

33. When reading or studying, I
   a. prefer total silence
   b. prefer to listen to music in background
   c. I listen to background music only when reading for enjoyment, not while studying
	34. I like to learn a movement in sports or dance step better by
	   a. hearing a verbal explanation and repeating the action or step mentally
	   b. watching and then trying to do it
	   c. watching and then imitating and talking about it

35. In my daily life	36. When studying for an exam
a. I like to follow a routine b. Going with the flow, doing things differently each time c. Sometimes I follow a routine, sometimes I don't	a. I would like to refer to the graphical illustrations like pictures, maps, charts etc. for better understanding b. I can study well by reading texts. I don't require graphical illustrations c. I can learn with or without graphical illustrations
37. I like to	38. When I have to create new material
a. make 'to-do' lists and follow them b. do things spontaneously without making 'to-do' lists c. I can perform my daily activities with or without making 'to-do' lists	a. I like to build up on existing material b. I like to be innovative and create something absolutely new c. I am fine with both kinds about equally

39. Sit in a relaxed position and clasp your hands together.
Which thumb is on top?

   a. Left
   b. Right
   c. Both are parallel

Appendix-3

Name_____Age_____

Phone No._____Gender_____Type of school (Govt/Private)_____

Name of your school_____

Instructions: You are asked to answer all questions. Kindly do not tick on both options. **Tick (✔)** **on either Yes/No.** Your responses shall be kept confidential. They shall be used only for research purpose.

Assessment of Metacognitive awareness	Yes	No
1. I ask myself periodically if I am fulfilling my goals.		
2. I come up with several alternatives to a problem before I answer.		
3. In order to solve tasks, I try to use strategies that have worked in the past for me.		
4. I quicken my pace/speed while learning in order to save time.		
5. I understand my intellectual strengths and weaknesses.		
6. I think about what I really need to learn before I begin a task.		
7. Once I finish a test/exam, I know how well I did.		
8. I set specific goals before I begin a task.		
9. I take more time (slow down my pace) when I come across important information.		
10. I know what kind of information is most important to learn.		
11. I ask myself if I have considered all options when solving a problem.		
12. I am good at organizing information.		
13. I consciously focus my attention on important information.		
14. I have a specific purpose/reason for each learning strategy I use.		
15. I learn best when I already know something about the topic.		
16. I know what the teacher expects me to learn.		
17. I am good at remembering information.		
18. I use different learning strategies depending on the situation.		

19. After I finish my task, I ask myself if there was an easier way to complete the task.		
20. I have control over how well I learn.		
21. I periodically review the chapters/lessons to help me understand important relationships in the concepts I'm learning.		
22. I ask myself questions about the study material before I begin.		
23. I think of several ways to solve a problem and choose the best one.		
24. I summarize what I've learned after I finish.		
25. I ask others for help when I don't understand something.		
26. I can motivate myself to learn when I need to.		
27. I am aware of what strategies I use when I study.		
28. I find myself analysing the usefulness of strategies while I study.		
29. I use my mental (intellectual) strengths to make up/compensate for my weaknesses.		
30. I focus on the meaning and significance of new information.		
31. I create my own examples to make information more meaningful.		
32. I am a good judge of how well I understand something.		
33. I find myself using helpful learning strategies automatically.		
34. I find myself pausing regularly to check how much I've understood.		
35. I know when each strategy I use will be most effective.		
36. I ask myself how well I accomplished my goals once I'm finished.		
37. I draw pictures or diagrams to help me understand while learning.		
38. I ask myself if I have considered all options after I solve a problem.		
39. I try to translate new information into my own words.		
40. I change my learning strategies when I fail to understand.		
41. I look at how the text is organized in the book/notebook in order to learn better.		
42. I read instructions carefully before I begin a task.		
43. I ask myself if what I'm reading is related to what I already know.		

44. I re-evaluate my assumptions/guesses when I get confused.		
45. I organize my time to best accomplish my goals.		
46. I learn more when I am interested in the topic.		
47. I study by breaking down information into smaller parts.		
48. When I study, I focus on the overall meaning rather than specifics.		
49. I ask myself questions about how well I am doing while I am learning something new.		
50. I ask myself if I learned as much as I could have once I finish a task.		
51. I stop and go back over new information that is not clear.		
52. I stop and reread the line/paragraph when I get confused.		

Appendix-4

Name_____Age_____

Phone No._____Gender_____Type of school (Govt/Private)_____

Name of your school_____

Instructions: You are asked to answer all questions. Kindly do not tick on all options. **Tick ✔) on only one of the five options.** Your responses shall be kept confidential. They shall be used only for research purpose.

SD=Strongly disagree
D=Disagree
N=Neither agree nor disagree
A=Agree
SA=Strongly agree

Assessment of Learning styles (Choose only one option from the given 5 options)	SD	D	N	A	SA
1. I draw arrows, lines, links or underline or highlight my notes with colors when I study.					
2. I understand better when someone verbally explains the concept to me.					
3. I like to build models whenever given the opportunity to.					
4. I don't like to perform experiments.					
5. Hands on activities keep me active and interested.					
6. I remember better by converting my notes/texts into symbols, pictures or flowcharts.					
7. Listening to a lecture is boring.					
8. I understand better when I see what my Biology teacher writes on the board.					
9. I learn better when my classmates share their ideas out loud and have meaningful conversations about the lesson.					
10. After I watch someone perform an activity I try it myself.					
11. I forget explanations given by other people very easily.					
12. I take down notes and review them whenever I need to.					

13. I learn better by doing something instead of just following what people tell me to do.					
14. I learn about Biological concepts which I cannot see (Eg. Bacteria) by picturing/imagining them in my mind.					
15. I remember more of what is said to me verbally than what I see.					
16. I don't like to participate in classroom activities.					
17. Having discussions with friends helps me learn better.					
18. I like to observe real objects and working models. I can learn and understand better.					
19. I like doing projects because I can make and manipulate things.					
20. I get confused when the teacher uses pictures/diagrams while teaching.					
21. I do not use my imagination to study Biology.					
22. Reading the text aloud while studying helps me learn better.					
23. I would rather listen to a lecture or speech than read the same thing in a textbook.					
24. Practical classes/laboratory classes do not excite me much.					
25. Learning with the help of charts and maps bores me.					
26. I participate in activities where I can move around and indulge in body movement.					
27. I want to sit in the front rows always because I want to hear the lecture properly.					
28. Textbooks should not have graphical illustrations. I can understand better through texts and lectures.					
29. I do not prefer to receive oral instructions.					
30. I understand better when I examine real objects like plants, roots, insects, etc. and relate them with my classroom learning.					

Appendix-5

Name_____Age_____

Phone No._____Gender_____Type of school (Govt/Private)_____

Name of your school_____

Instructions: This test is divided into 2 parts: Part A and Part B.

Part A consists of only objective type questions. You are asked to answer **all** questions.

Part B consists of 8 questions, each having 2 choices. You are asked to answer **either one** of them, for all 8 questions.

The marks of this test shall be kept confidential. It shall be used only for research purpose by the researcher.

Total marks of the test is 50.

<div align="center">

PART A   (34 X 1= 34)

</div>

1. Name the pyrimidine that is present in RNA but not in DNA.
i) Adenine
ii) Guanine
iii) Cytosine
iv) Uracil

2. Frameshift mutations occur due to:
i) Base substitutions
ii) Tautomeric shifts
iii) Insertion/ deletion of bases
iv) Dimer formation

3. Name the scientist who gave the theory of Natural selection.
i) Miller
ii) Koch
iii) Darwin
iv) Helmont

4. Identify the blank spaces a,b,c and d in the table given below:

Type of microbe	Name	Product obtained
Fungus	*a*	Penicillium
Bacteria	Acetobacter acetii	*b*
c	Aspergillus niger	Citric acid
Yeast	*d*	Ethanol

i) a-Penicillium notatum, b-Acetic acid, c-Fungus, d-Saccharomyces cerevisiae

ii) a-Lactobacillus, b-Lactic acid, c-Fungus, d-Rhizobium

iii) a-Penicillium notatum, b-Lactic acid, c-Virus, d- Yeast

iv) a- Streptococcus, b-Acetic acid, c-Virus, d- Azotobacter

5. The organelle shown below is responsible for:
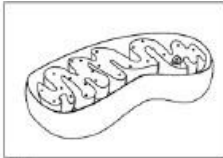
i) Digesting the unwanted waste materials formed by the cell

ii) Forming proteins

iii) Transporting ions within the cell

iv) Powering the biochemical reactions in the cell

6. Which disease is not caused by bacteria?

i) Pneumonia

ii) Typhoid

iii) Common cold

iv) Tetanus

7. Identify a and b:

i) a=translation; b=transcription

ii) a= transcription; b=replication

iii) a= transcription; b= translation

iv) a= replication; b=transcription

8. Identify the odd one out from among the following:

i) Ovary

ii) Stigma

iii) Style

iv) Anther

9. Select the option with the correctly matched columns.

a. Innate immunity	i. Attacks own body cells
b. Passive immunity	ii. Involves memory cells
c. Auto immunity	iii. Present at birth
d. Acquired immunity	iv. Ready made antibiotics given

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

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

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

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

10. Observe the following diagrams carefully and select the option that shows the correct site of fertilization in humans. The site is marked with a round black circle.

i)   ii)   iii)   iv)

11. One of the best applications of Biotechnology in Agriculture is the successful production of
i) Dt cotton
ii) Gt cotton
iii) Bt cotton
iv) Pt cotton

12. Sunita had bread, cheese, milk, and eggs for breakfast; rice and fish for lunch; roti, chicken and beans for dinner. Utilize your knowledge about nutrients and find out what kind of food Sunita ate excessively today?
i) Carbohydrates
ii) Fats
iii) Proteins
iv) Fibres

13. Identify the correct sequence of events related to sexual reproduction.
i)   Gametogenesis→Fertilization→Zygote formation
ii)   Embryogenesis→Gametogenesis→Fertilization
iii)   Gametogenesis→Embryogenesis→Fertilization
iv)   Embryogenesis→Fertilization→Zygote formation

14. Assume that a non-pregnant woman has a menstruation cycle of exactly 30 days. Using this information, determine how many mature eggs will be produced by the ovaries of the woman in one year.
i) 6
ii) 12
iii) 24
iv) 48

15. Cloning of animals is an application of
i) Computer technology
ii) Biotechnology
iii) Autoradiography
iv) Nuclear technology

16. The type of cell division shown in the diagram is:
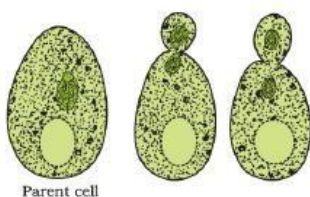
i) Binary fission
ii) Bud formation
iii) Vegetative propagation
iv) Sporulation

Parent cell

226

17. Identify the pair that is mismatched.
i) Leydig cells- Testesterone production
ii) Seminiferous tubules- Sperm production
iii) Vas deferens- Provides nutrition to sperms
iv) Urethra- conducts sperms and urine

18. Analyse the following statements related to Sexual reproduction and identify only the correct statement.
i) Sexual reproduction involves the fusion of gametes.
ii) The male and female reproductive parts are always present in the same organism.
iii) Formation of zygote is not compulsory.
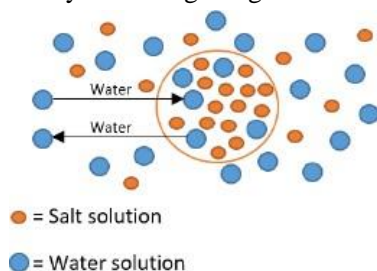iv) Sexual reproduction involves the replication of DNA.

19. You have already learnt that in a DNA, the number of Adenine molecules is equal to the number of Thymine molecules and Guanine molecules are equal to Cytosine molecules. So, if a DNA has 20% of Cytosine, the percentage of Adenine in the DNA will be:
i) 20%
ii) 30%
iii) 50%
iv) 60%

20. Identify which of the following organs are in charge of digestion:

A.　　　　　　　　B.　　　　　　　　C.　　　　　　　　D.

　i)　　　A and B
　ii)　　　B and C
　iii)　　　C and D
　iv)　　　A and D
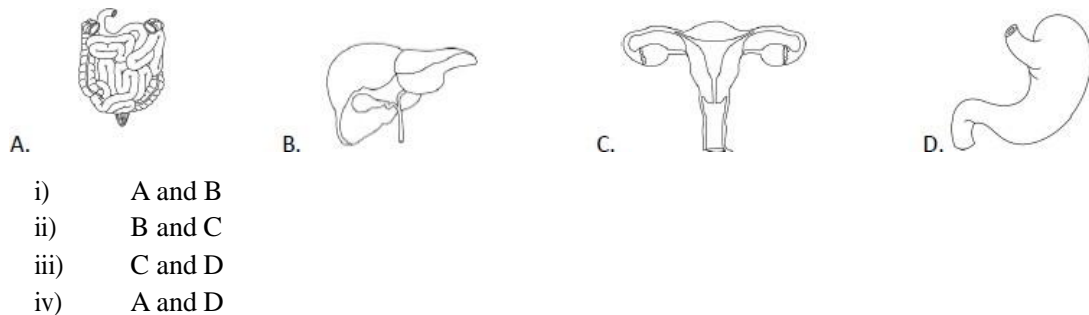
21. Analyse the diagram given below and identify the type of solution shown.

Water
Water

● = Salt solution
● = Water solution

i) Hypertonic solution
ii) Isotonic solution
iii) Hypotonic solution
iv) Sweet solution

22. In one of the options given below, genetic material is correctly arranged from smallest to largest. Select the correct option.
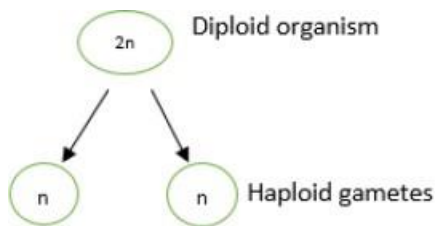
i)	Cell → Chromosome → DNA → Gene		
ii)	Gene → DNA → Chromosome → Cell		
iii)	Chromosome → Gene → Cell → DNA		
iv)	DNA → Gene → Chromosome → Cell		

23. Your mother must be making curd at home from milk. Milk changes into curd with the help of which bacteria?
i) Acetobacter acetii
ii) Lactobacillus
iii) Saccharomyces cerevisiae
iv)Rhizobium

24. Distinguish the type of cell division shown below.

i) Mitosis
ii) Syngamy
iii) Meiosis
iv) Embryogenesis

25. Utilize your knowledge about Reproductive health to find out which among the following is not a contraceptive method.
i) Intrauterine devices
ii) Tubectomy
iii) Abortion
iv)Oral pills

26. Simi's meals are composed of carbohydrates only. If she continues to consume food in such a manner, what will happen to her body?
i) It will be stored as vitamins in the body
ii) Excess carbohydrate will build muscles in her body
iii) The carbohydrates will turn into fat and make her gain weight
iv)Her body will get tired very easily

27. Which among the following is an example of good personal hygiene?
i) Eating without washing your hands
ii) Showering and putting on clean clothes after playing a sport
iii) Brushing your teeth once a week
iv)Washing clothes once a year

28. In the following table, + stands for beneficial interaction and - for harmful interaction. Analyse the different types of interactions (a,b,c) and select the correct option from the options given below.

Species A	Species B	Type of interaction
+	+	a
-	-	b
+	-	c

i) a=commensalism, b=competition, c=parasitism

ii) a=mutualism, b= competition, c= predation

iii) a=commensalism, b=ammensalism, c=parasitism

iv)a=mutualism, b=commensalism, c= predation

29. Kelly: I throw chips packets in the dustbin only if someone asks me to.

Mel: I always throw chips packets in the dustbin and teach my siblings to do so.

Jack: I hardly throw garbage in the dustbin. The environment will always be dirty.

Ricky: If I see a plastic bottle thrown on the road, I pick it up and throw it in the garbage dumping area.

Which of the above-mentioned statements represent examples of correct behaviour towards environment cleanliness?

i) Kelly and Mel

ii) Kelly and Jack

iii) Mel and Ricky

iv) Mel and Jack

30. Identify the incorrect statement from the following.

i) CNG burns more efficiently than petrol and diesel.

ii) CNG stands for Compressed natural gas.

iii) CNG is costlier than petrol.

iv)Vehicular pollution can be controlled by using CNG

31. Which among the following is not a sexually transmitted disease?

i) Syphilis

ii) HIV-AIDS

iii) Gonorrhoea
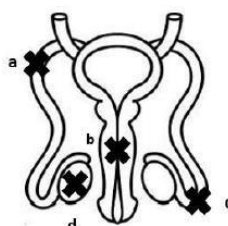
iv)Cholera

32. The type of reproduction shown below is
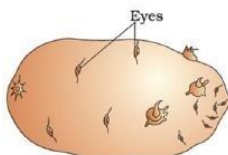
i) Budding

ii) Vegetative propagation

iii) Grafting

iv) Spore formation

33. The hard outer layer of pollen grains is known as

i) Collagen

ii) Exine

iii) Intine

iv) Capsule

34. Identify the Vas deferens in the given outline of the male reproductive system.

i) a

ii) b

iii) c

iv) d

## PART B   (8 X 2= 16)

1. We all have been vaccined since childhood for different diseases. How does vaccination work in helping us to fight against these diseases?

   Or

   You must have observed cactus plants at home. Analyse their structure in comparison with other plants and state how they can survive even in less water.

2. With regard to menstruation in females, answer the following questions:
   - i)   Why does menstruation occur?
   - ii)   Differentiate between oestrogen and progesterone.

   Or

   With regard to various types of interactions between species, answer the following questions:
   - i)   Explain Mutualism.
   - ii)   Differentiate between Ectoparasitism and Endoparatism.

3. Identify and explain what is happening in the diagram given below.
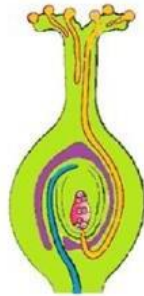
   Or

   The following is an outline for the trophic levels of an ecosystem. Explain how this works and also provide examples for each level.
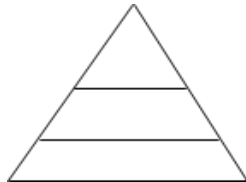
4. Explain how the human body maintains its normal body temperature during summer (hot weather) and winter (cold weather)?

   Or

   Explain Biomagnification and Eutrophication.

5. The chromosomes coming from the father (XY) determine the gender of the baby. Justify this statement.

   Or

   Suggest two methods by which an infertile couple can have children. Also, explain each method in brief.

6. Illustrate and explain any two types of asexual reproduction with proper labelling.

   Or

   Illustrate and explain the structures of the male and female reproductive parts of a flower with proper labelling.

7. Explain with the help of a labelled diagram the process of DNA replication.

   Or

   If a tall plant (TT) is crossed with a short plant (tt), what will be the progeny formed in the F1 and F2 generations?? Explain with the help of a cross diagram.

8. Describe four activities by which the water drains in your locality/society are getting polluted. Think properly, evaluate and answer.

   Or

   Describe four major and specific environmental problems that you are witnessing in the state of Sikkim at present.