केन्द्रीय माध्यमिक शिक्षा बोर्ड, दिल्ली
सीनियर स्कूल सर्टिफिकेट परीक्षा (कक्षा बारहवीं)
परीक्षार्थी प्रवेश–पत्र के अनुसार भरे

विषय Subject : BIOLOGY

विषय कोड Subject Code : 044

परीक्षा का दिन एवं तिथि
Day & Date of the Examination : SATURDAY, 14.03.2020

उत्तर देने का माध्यम
Medium of answering the paper : ENGLISH

प्रश्न पत्र के ऊपर लिखे कोड को दर्शाए : Write code No. as written on the top of the question paper :	Code Number	Set Number
	57/1/1	● ② ③ ④

अतिरिक्त उत्तर–पुस्तिका (ओं) की संख्या
No . of supplementary answer -book(s) used : –

बेंचमार्क विकलांग व्यक्ति : हाँ / नहीं
Person with Benchmark Disabilities : Yes / No : No

विकलांगता का कोड (प्रवेश पत्र के अनुसार)
Code of Disability (As per the admit card) : NA

क्या लेखन – लिपिक उपलब्ध करवाया गया : हाँ / नहीं
Whether writer provided : Yes / No : No

यदि दृष्टिहीन हैं तो उपयोग में लाए गये सोफ्टवेयर का नाम :
If Visually challenged, name of software used : NA

*एक खाने में एक अक्षर लिखें। नाम के प्रत्येक भाग के बीच एक खाना रिक्त छोड़ दें। यदि परीक्षार्थी का नाम 24 अक्षरों से अधिक है, तो केवल नाम के प्रथम 24 अक्षर ही लिखें।

Each letter be written in one box and one box be left blank between each part of the name. In case Candidate's Name exceeds 24 letters, write first 24 letters.

कार्यालय उपयोग के लिए
Space for office use

Section - A

1. (C) The normal DNA form is N-DNA

2. (C) the flower is cleistogamous

3. (C) Tissue culture

4. (D) Skin

5. (D) Agrobacterium

Section - B

6. (a) 5' ATGCATGCATGCATGC 3' is its complementary (Polarity = 1/2; N-S = 1/2)

(b) The possible RNA strand is 5' AUGCAUGCAUGCAUGC (Polarity N-S =

7. Wings of birds and wings of butterflies are not anatomically similar but contribute to the same function i.e locomotion which exactly represents how organisms with different structures adapt to similar functions ½ ½ in common habitat and converge in a same direction. Hence, they represent convergent type of evolution though having analogous organs and no common ancestors.

8. It is often observed because when our body gets infected from a pathogen for the first time our body initiates a primary response of low intensity against it through the antibodies produced from our immunity. But, after this

stand

3'.
=1½;

primary response our body has some memory B cells which remember the antigens produced by the pathogens and thus on any further interaction with these similar pathogen or antigens it initiates a highly intensified secondary or anamnestic response. Hence, the chances of suffering are low. 1+1

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9. The three hormones produced only during pregnancy in a women are :-

(a) hcg (human chorionic gonadotropin).
(b) Relanin produced by ovary.
(c) hpl (human placental lactogen).

The level of estrogen and progesteron during

pregnancy is as follows :-

(a) Level of estrogen first ~~decreases~~ increases slightly during initial period of pregnancy but later increases too many folds during the gestation and later phase.

(b) Level of progesterone increases throughout the pregnancy.

10. The response exhibited by the student is allergy and it can be due to allergens such as dust, pollen, mites etc $\frac{1}{2} + \frac{1}{2}$ which are different in different environments. Hence, due to interaction with these allergens the body produces an exaggerated immune response and IgE antibodies are produced. The sneezing and running nose are common symptoms exhibited during allergy due to histamine produced by mast cells. Antihistamines can be very

helpful in controlling these allergic responses

11. In cross breeding an individual from a breed is crossed with another individual from a different breed in order to obtain a hybrid with desirable genes and superior ~~quality~~. One of the most widely done cross breeding example in current time is of "Hisardale" from "Bikaneri Ewes" and "Marino rams" which are commercially and economically feasible and viable as well. $\frac{1}{2} + \frac{1}{2}$

12. The genus is "Nucleopolyhedrovirus" which acts as a biological control agent.

The three reasons are :-

(a) It is species specific and acts only against a specific species of pest.

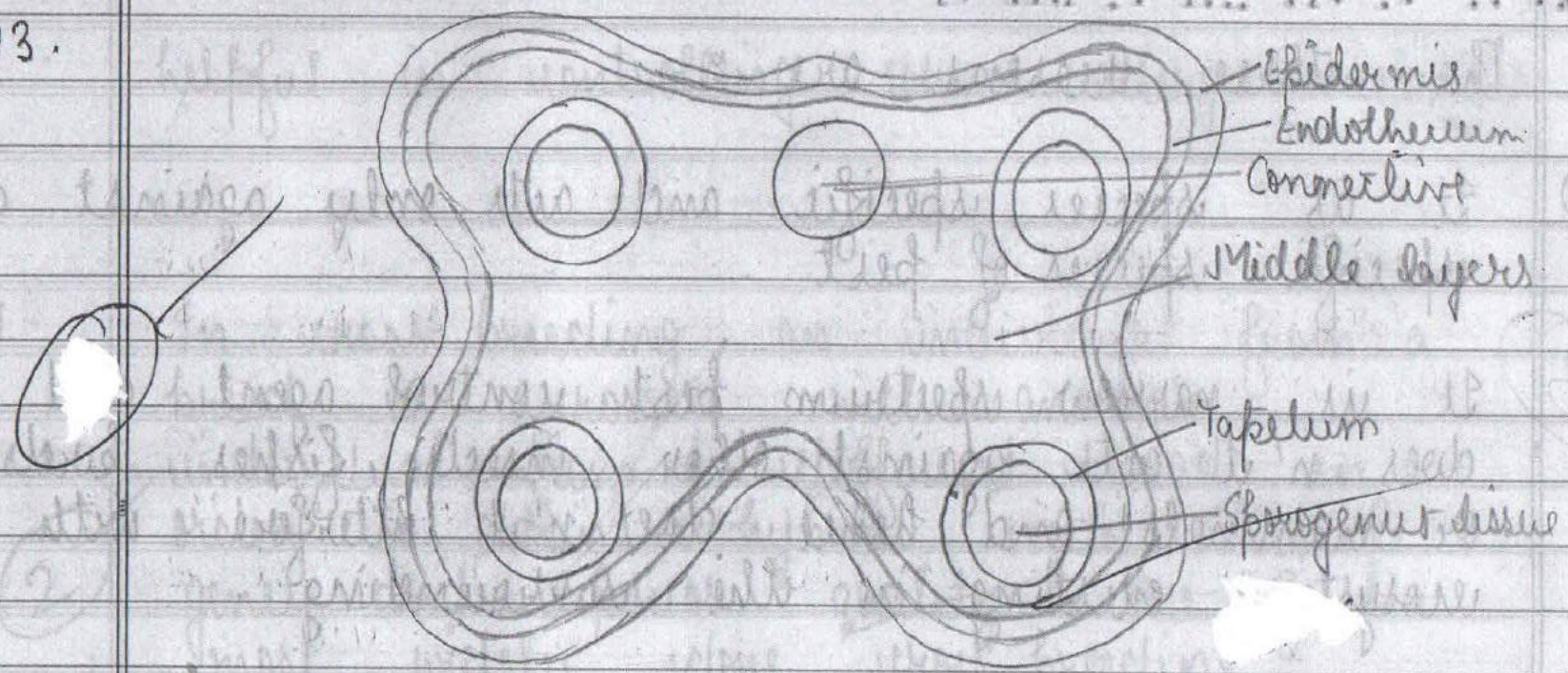
(b) It is narrow spectrum pest control agent and does n't acts against other insects, fishes, birds or mammals and hence does n't interfere with ecosystem existing in the surrounding.

(c) It acts only on target species hence does n't eliminates desired & beneficial insects.

$\frac{1}{2} \times 4$

Section - C

13.



T.S of a mature anther of an Angiosperm

14. The differences between wind pollinated and insect pollinated flowers are as following :-

Wind Pollinated	Insect Pollinated
1. It is an abiotic mode of pollination also called as anemophily.	1. It is a biotic mode of pollination also called as entomophily.
2. Pollen grains produced by these flowers are non-sticky and light.	2. Pollen grains produced by these flowers are sticky.
3. These flowers are often white and colourless as well as odourless.	3. These flowers are often and generally colourfull with colours to attract their pollinators
4. These flowers have exposed stamen and pistil with a single ovule.	4. These flowers are of any type and may contain more

		than a single ovule.
5.	The flowers are small and often clustered in conspicous inflorescence.	5. The flowers are large but can get grouped in an inflorescence.
6.	The chances of pollination is less hence more number of pollens are produced. Moreover, they don't offer any floral rewards like nectar.	6. They offer floral rewards such as nectar and pollen and chance of pollination is high.

15. Human males suffer from haemophilia more than human females because haemophilia is a sex linked recessive disease.

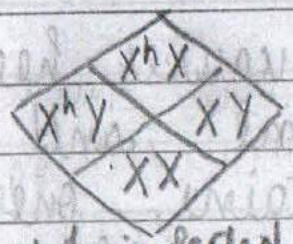
The genes which causes haemophilia are located on X sex chromosome and are recessive. As a male contains one X and one Y sex chromosome thus even only presence of one X^h (or infected gene carrying X chromosome) is enough to cause infection in man and does thus it affects the man/male.

Whereas for a female who carries XX chromosome as its sex chromosome has to carry X^hX^h to be infected as for such a sufferer the mother should be the carrier and father should be a haemophilic (later unviable). Hence, the chances of female to be sufferer is very rare.

P - X^hX . XY

Gametes - (X^h) (X) × (X) (Y)

F1 generation



1 Carrier Female , 1 infected male , 1 non infected male & 1 non infected female

Hence, the chances of a female to be a haemophilic is very rare and the chances of a man to be sufferer is quite high. This haemophilia is caused due to absence of the Anti haemophilic factor and Christmas factor from the cascades of protein which cause clotting of blood.

XY

These disease used to run in the family line of Queen Victoria as she ~~was~~ the carrier of it.

16. Milk transforms into curd with the help of lactobacillus or LAB (Lactic acid forming bacteria). These bacteria when added as a starter/inoculum at a suitable / optimum temperature converts the milk into curd by partially digesting and coagulating the milk.

Thus, these starter changes the milk into curd by these ways and the lactic acid produced by them tends to coagulate the milk for the conversion into curd.

The end product formed proves to be beneficial as these Lactobacillus make curd enriched with Vitamin B_{12} (or cyanocobalamine) which is essential to prevent pernicious anaemia and several other disease in human.

17. Alien species invasion is definetely a great threat to biodiversity as described as one of "~~Evil~~ SOBRIQUET" i.e "EVIL QUARTLET".

These alien species when introduced in a new habitat compete with the existing species for the limited resources and tends to eliminate the already existing species in the absence of their predator species in the new natural habitat. They multiply at a faster rate and tends to grow at a phenomenal rate in the ~~presence~~ absence of their predator.

One of the most sought example in this is of Eichornia crassipiens and Lanthana.
Eichornia also known as "Terror of Bengal" was introduced in India 's aquatic bodies for their beautiful shape of leaves but due to the absence of its natural predator

it propagated at a phenomenal rate in water bodies, thus draining the amount of dissolved oxygen from it and killing other aquatic plants and animals.

2 x 1/2

The three other causes for such a loss of biodiversity are :-

(a) Habitat loss and Fragmentation
(b) Overexploitation by humans
(c) Co-extinction

18. a → Chilli
b → Chilli Mosaic virus, Tobacco mosaic virus and Leaf curl

c → Mustard (Brassica)
d → Pusa Swarnim (Karan Rai)
e → Wheat
f → Hill bunt and Leaf and stripe rust

19. The three steps carried out in the formation of recombinant DNA using enzyme EcoRI are :-

(a) Isolation of Desirable gene containing Foreign DNA

The DNA containing desirable gene is identified and isolated by using several enzymes. The cell wall is digested by using cellulase enzyme in plants, lysozyme in bacteria etc. Further it is subjected to RNAse and Protease to digest RNA and proteins. Finally pure desired DNA is spooled after addition of chilled

ethanol in it.

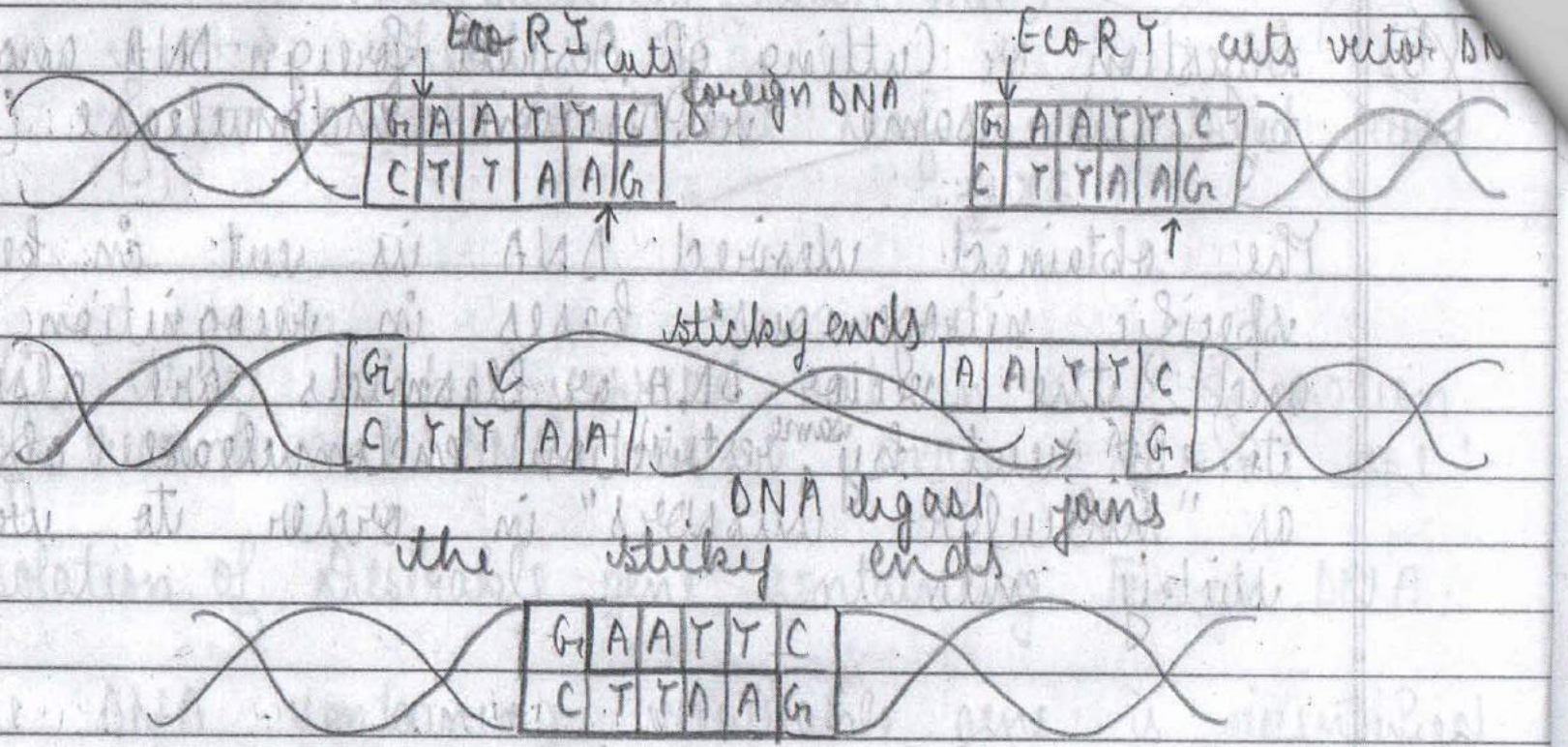
(b) Digestion or Cutting of Desired foreign DNA and Vector DNA by the same restriction endonuclease (EcoRI).

The obtained desired DNA is cut on between specific nitrogeneous bases in recognition sequence and the vector DNA or plasmids are also subjected to be cut by same restriction endonuclease also called as "molecular scissors" in order to create sticky ends.

(c) The foreign DNA is joined with vector DNA resulting in formation of rDNA

The foreign DNA with desirable gene is ligated with plasmid (vector DNA). The sticky ends of both DNA are joined together and the

recombinant DNA is formed :-



∴ DNA is formed

The 3 steps of rDNA formation

20. The two natural cloning vectors are plasmid of E. coli etc and Ti plasmid of Agrobacterium tumifaciens. Infact retroviruses & also provides their plasmid in order to provide genes of desired interest. Moreover pBr322 and pUC8 are also two widely used plasmids responsible for acting as a cloning vector to deliver gene of interest.

These plasmids and bacteriophages can inculcate themselves with host DNA and produce their multiple copies according to their copy numbers. Thus, these extra chromosomal self replicating DNA helps a lot in delivering gene of interest and act as cloning vector.

The two characteristics of these vectors should be :-

(a) Presence of Origin of Replication

These cloning vectors should possess ori (origin of replication) as the presence of it is required to initiate any kind of replication without these the process of replication cannot be carried out. Also, one must ensure that the vectors should support origin of replication with high copy numbers to support 100 many copies.

(b) Selection of Transformants from Selectable marker

These cloning vectors must contain antibiotic resistant genes like tetracyclin and ampicillin etc. to select transformants from non-transformants after the creation of recombinant DNA. These selectable markers are

very much needed to identify transformants from non transformants. Hence, it is a very important attribute indeed.

21. Commensalism type of interaction takes place where one species is benefitted and the other species remain neutral and does n't deserve any loss or benefit. In commensalism the two interacting species closely stays together and interact with each other.
There are many examples of commensalism and one such can be witnessed in between cattle egrets and grazing cattles. The cattle egrets carefully follow the grazing cattle and when these cattle stir and flush up vegetation cattle egrets eat the insects in those vegetation which may not be visible to it

on its own but is easily found out in staying close to cattle. Here, the cattle does n't derives anything and stays neutral whereas cattle egrets are benefitted.

In Mutualism whereas the two interacting species both derive benefits from each other and are mutually profitted. But, the two interacting species does n't it stays as closer to each other as in commensalism.

One of its examples can be witnessed in the association between fungi and roots of higher plants resulting in the formation of mycorhizza. Here, both are benefitted as fungi helps plant roots to derive more nutrients from the soil and fungi intern is provided with high energing yielding carbohydrates.

Section - D

22 (a) Proinsulin undergoes maturation by dropping C peptide free from it and the mature insulin only contains A and B polypeptide joined together by disulphide linkage. 1

(b) The company used recombinant DNA technology in order to produce two different polypeptides A and B and then obtained it from E. coli. The company further joined the two polypeptides with disulphide linkage. 1

(c) The two polypeptides are joined together by disulphide bridges or linkages.

23. (a) The cell division A is meiosis and B is mitosis in female and male honey bees respectively. 1+1+1

(b) The process C is parthenogenesis i.e development of an organism from a gamete without undergoing fertilization. In male honey bees it it is called as Arrhenotoky (a type of parthenogenesis).

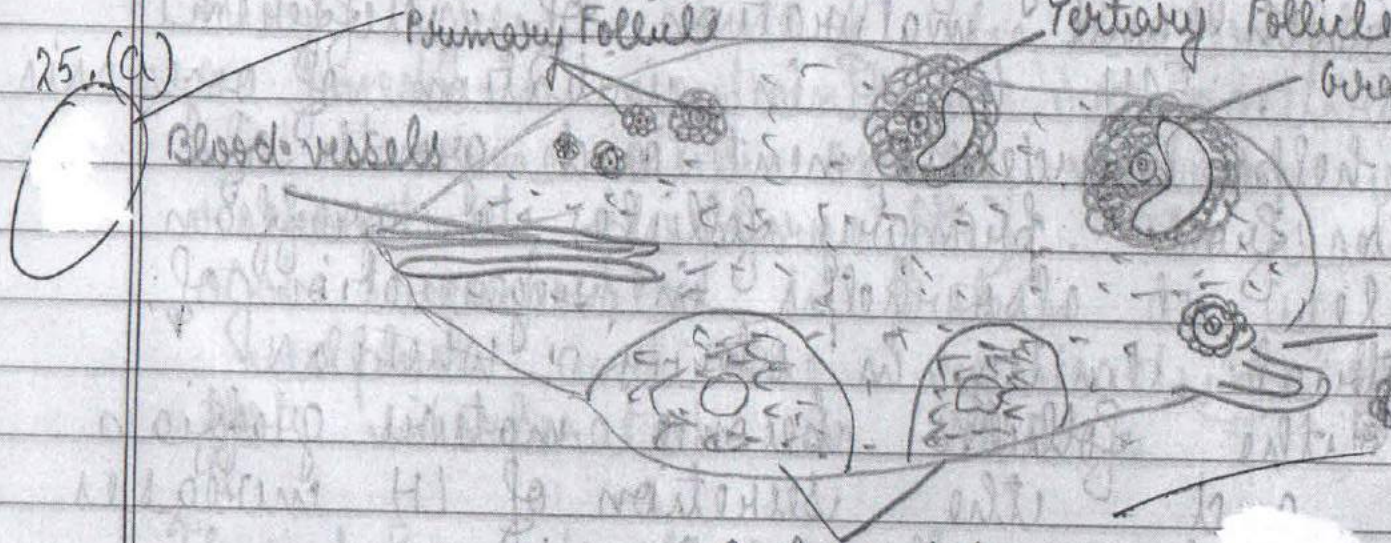
24. (a) The pyramid B is declining type of population growth and C is stable type of population growth. 1

(b) The above pyramids are plotted on the basis of number of people present in different age groups in a reproductive cycle. The population is divided

into three age groups i.e Pre-reproductive, Reproductive and Post reproductive in order to determine its growth rate.

Section - E

25. (a)



Sectional view of Human Ovary

(b) The gonadotropins responsible for oogenesis are LH and ~~FSH~~ FSH. ½ LH½ (Luteinising hormone) and FSH (Follicular stimulating hormone) are secreted from Anterior pituitary gland. The LH secreted from it helps in secretion of estrogen from the growing follicles whereas FSH helps in growth and maturation of different follicles. FSH helps in initiation of oogenesis and helps in development and growth of follicles from primary follicle to graffian follicle it also helps in regeneration of endometrial lining in uterus whereas after the follicles become mature graffian follicle and the secretion of LH increases tremendously resulting in LH surge. This LH surge results in ovulation and hence the ova gets released,

26. Hershey and Chase experiment proved unequivocally that DNA acts as a genetic material. They performed their experiment with bacteriophages which infect bacterial cell by incorporating their viral genetic material with host DNA. They grew some of the bacteriophages on a medium containing radioactive sulphur ($_{16}S^{35}$) and some other on a medium containing radioactive phosphorus ($_{15}P^{32}$). The radioactive sulphur got incorporated in protein as it contains sulphur and the radioactive phosphorus got incorporated in DNA.

They performed their experiment in further 3 steps :-

1) Infection - They allowed the two different forms of bacteriophages to infect the bacteria and allowed their genetic material to

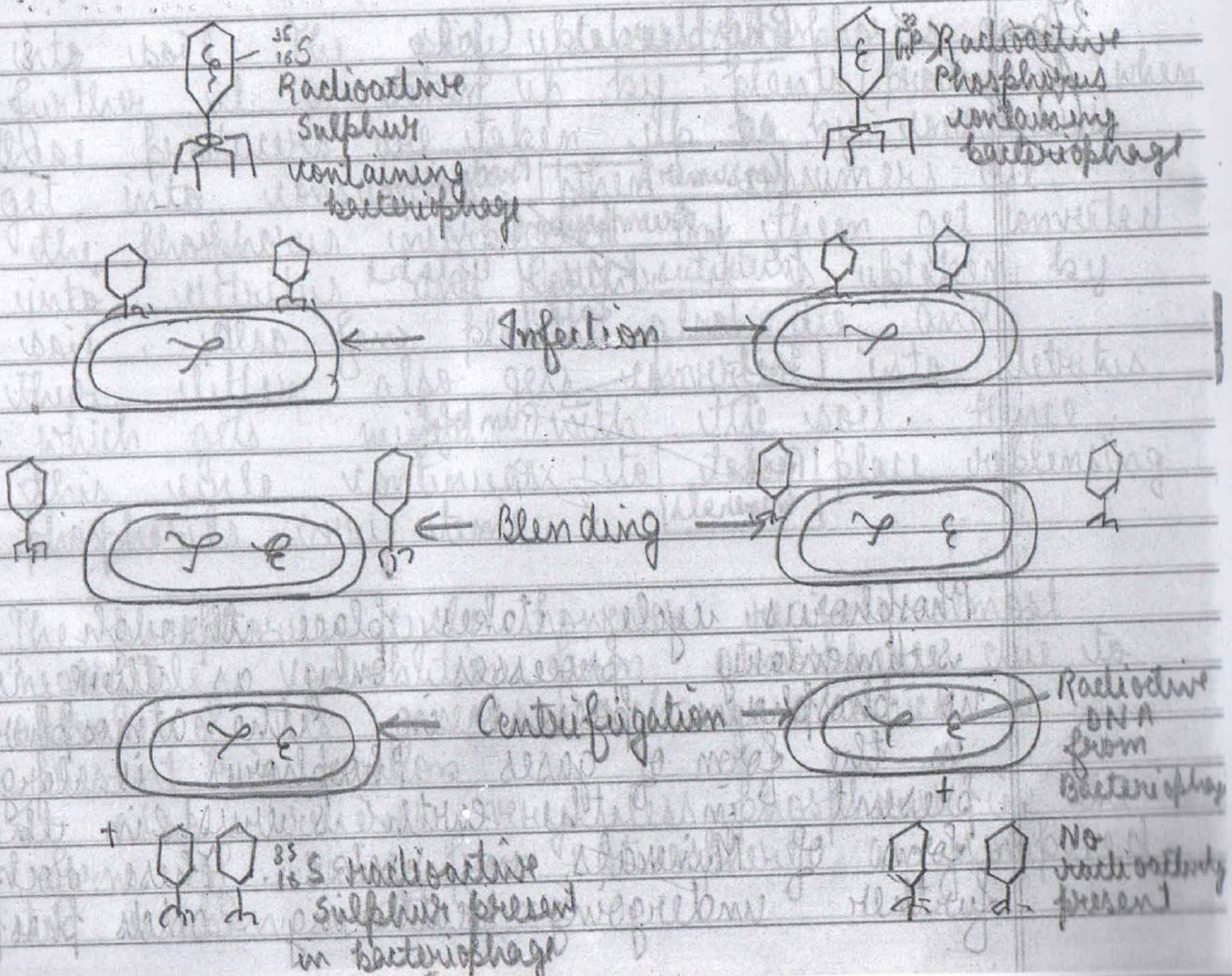
enter in it.

ii) Blending - They performed blending to separate the coats of bacteriophages from it and obtained bacteria infected with genetic material.

iii) Centrifugation - They performed centrifugation and obtained supernatant in both cases.

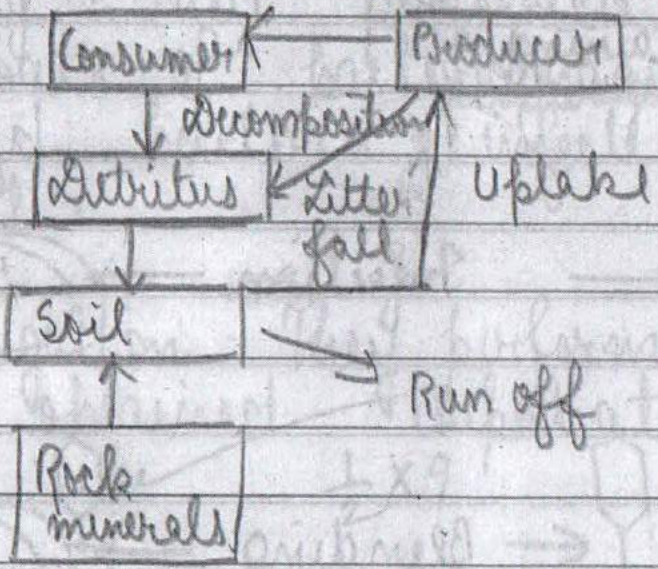
Conclusion :- They obtained radioactive sulphur containing bacterial coats in supernatant as it does n't enters inside the bacteria and the bacteria obtained contained radioactive genetic material with $^{32}_{15}P$ which unequivocally proved that DNA acts as a genetic material and enters inside the bacteria to cause infection & replication.

Hershey - Chase Experiment



27.

Phosphorus Cycle



Phosphorus cycle takes place through sedimentary processes only as there is no phosphorus present in the atmosphere in the form of gases. Phosphorus is largely present in the earth's crust in the form of Minerals in rocks. These rocks further undergoing weathering adds phosphates

into soil. The soil uptakes phosphorus and further it is taken up by plants (producers) when these producers are taken up by consumers get into consumers. When consumers die the phosphorus incorporated in them get converted into detritus and further it is uptaken by soil. Also, few plants also die and their litter also gets converted into detritus which gets mixed with the soil. Hence, this cycle continues to take place replensing phosphorus every time.

* The phosphorus cycle however receives almost negligible contribution from atmosphere due to absence of its gaseous exchange which is present in carbon.
* It also receives very less phosphorus in the form of rains from atmosphere as compared to carbon.