केन्द्रीय माध्यमिक शिक्षा बोर्ड, दिल्ली

सीनियर स्कूल सर्टिफिकेट परीक्षा (कक्षा बारहवीं)

परीक्षार्थी प्रवेश–पत्र के अनुसार भरें

विषय **Subject :** Biology

विषय कोड **Subject Code :** 044

परीक्षा का दिन एवं तिथि
Day & Date of the Examination : Monday, 23rd March, 2015

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
	57/1/3	① ② ● ④

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

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

किसी शारीरिक अक्षमता से प्रभावित हो तो संबंधित वर्ग में ✓ का निशान लगाऐं।
If physically challenged, tick the category

B	D	H	S	C	A

B = दृष्टिहीन, D = मूक व बधिर, H = शारीरिक रूप से विकलांग, S = स्पास्टिक
C = डिस्लेक्सिक, A = ऑटिस्टिक
B = Visually Impaired, D = Hearing Impaired, H = Physically Challanged
S = Spastic, C = Dyslexic, A = Autistic

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

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

*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

2045819

044 / 04732

Section - E

Ans 24 (a) As 200 viable seeds are being produced ∴ 200 ovules should be present as 1 seed is formed by fertilization b/w 1 ♀ & 1 pollen grain & 1 ovule. ∴

(b) As 200 viable seeds are produced ∴ 200 pollen grains are required ∴ $\frac{200}{4} = 50$ microspore mother cells are required as 1 pollen grain develops from 1 microspore & 1 microspore mother cell forms 4 microspores. (microspore tetrad) by meiosis.

(c) 200 pollen grains are required as 1 pollen grain would fertilize one ovule. to form seed.

(d) Each pollen grain carries 2 male gametes. ∴ $200 \times 2 = 400$ male gametes would be required as 200 pollen grains are required for producing 200 seeds.

c) Each ovule differentiates one Megaspore Mother cell (MMC) in micropylar region. As 200 ovules are being used ∴ 200 MMC will be required. Each MMC undergoes meiosis to form 4 megaspores out of which 3 degenerate while 1 develops into embryosac which contains 1 egg cell.

ANS 25. At a give instant, a population is comprised of individuals of different ages. If age distribution (% of individuals of particular age or age group) is plotted for a population, the resulting structure formed is called age pyramid. The shape of age pyramid reflects the growth status of population. The age pyramid contains age distributions of both ♂ & ♀ in same pyramid. 3 types of age pyramids are:-

(1) → Post-reproductive
→ Reproductive
→ Pre reproductive

(2) Stable

(3) Declining.

Analysis of age pyramids provides information for long term planning as follows:- Case I → If age pyramid is expanding, i.e human population of that region/country is ↑sing with time as individuals who are pre-reproductive age group are more than in reproductive age group. So with time, the country's population will ↑. Government should take measures to control the country population like distribution of contraceptives, sex education, one child policy, etc incentive to small families & couples with one children. Otherwise due to ↑sing population the countries resources will deplete and not be able to support the population.

Case II → In case of stable age pyramid, the population of that country will remain almost fixed and stable as no. of individuals of pre-reproductive age group are equal to no. of individuals of reproductive age group. The government should ensure that countries population does not ↑ or ↓ either due to natural calamities, or resource depletion. They should make plans for equal resource distribution & opportunities (Health, Job, education) for all.

Case III → In case of declining age pyramid, the population will ↓ with time as no. of individuals of pre reproductive age group are less than the no. of individuals in reproductive age group. The govt. should try to make the population stable by encouraging couples to have more children, giving incentives to larger families, better opportunities & resources to them. otherwise with time the countries population will ↓ and eventually it would lead to ↓ in productivity of country

Ans 24. (1) ABO blood group in human beings is controlled by gene. I/I It has 3 alleles I^A, I^B, i.

(2) This gene I shows multiple allelism as 2 or more alleles control one character.

(3) In red blood cells, plasma membrane contains sugar polymers that protrude from the surface and the kind of sugar present is controlled by gene I.

(4) I^A & I^B alleles produce slightly different kind of sugars (sugar A & sugar B respectively). but i allele does not produce any sugar.

(5) I^A & I^B are completely dominant over recessive allele i but I^A & I^B are co-dominant wrt. to each other. i.e when both alleles, I^AI^B are present together, they both express themselves and produce their phenotypes. i.e. and both sugars are produced in the RBC.

	Possible genotypes.	Blood group/Phenotype.
(1)	$I^A I^A$	A
(2)	$I^A i$	A
(3)	$I^B I^B$	B
(4)	$I^B i$	B
(5)	ii	O
(6)	$I^A I^B$	AB.

∴ 6 genotypes are possible while only 4 phenotypes or blood groups are possible in humans.

Section - A

Ans 1 Euchromatin

Ans 2. A geneticist chooses org. whit with a short life cycle because the organism will produce the offsprings quickly in a short period of time. These offsprings can be studied by the geneticist and can also be further mated to produce more generation of offsprings.

For eg:- Drosophilia melanogaster (Fruit fly) completes its life cycle in 2 weeks. Thus it produces the offsprings in very short time and geneticist can study the variations in them. If an org which has long life cycle is chosen, then it would take years to complete research.

Ans 3 It is the use of bioresources & traditional knowledge by multinational companies and organisations without proper authorization from countries or concerned people and without compensatory payment.

Ans 4 During industrialization, air pollution ↑sed, dust, soot & other air pollutants settled on tree bark and converted its colour from white to dark. Also due to air pollution (SO_2), white lichens could not survive and they exposed the dark surfaces of the trees. The dark-coloured moths camouflaged with the surrounding but the white coloured could not camouflage and they were eaten by predator birds. Hence dark moth's ↑sed in numbers.

Ans 5. X rays are ionising electromagnetic radiations which induce mutations in DNA. They can convert normal cells into cancer cells. They cause many genetic disorders by changing / altering DNA sequence thus changing and organism's phenotypes & genotype. thru variations & mutation.

Section - C

Ans 11 (1) Parturition is the process of delivery of fully developed foetus or infant (child birth) thru birth canal. The signals for parturition originate from fully developed foetus and placenta.

(2) These signals induce mild uterine contractions called as foetal ejection reflex.

(3) These contractions trigger the release of oxytocin from the mother's pituitary. This acts on

uterine muscles, making the contractions stronger and stronger.
(4) ~~These chain of events~~ which further induces release of oxytocin.
(4) These chain events keep on going till the child is delivered out of the uterus thru birth canal. Soon after which the placenta is also expelled out. thru uterus.
(5) The hormones involved are estrogen, cortisol & Oxytocin.

Ans 12 (1) After triple fusion the, central cell develops to form primary endosperm cell which contain triploid primary endosperm nucleus.
(2) The primary endosperm cell undergoes successive cell divisions to form triploid endosperm which has abundant food reserves.
(3) The primary endosperm nucleus undergoes successive nuclear divisions to form many free nuclei. This type of endosperm development is called free nuclear endosperm. After which cell walls are laid, and

The endosperm becomes cellular endosperm. Ex: coconut water is nuclear endosperm (containing many free nuclei), while white kernel around is cellular endosperm.

→ The endosperm development preceeds that of zygote. to ensure that endosperm containing abundant food reserves is formed earlier and can nourish the developing embryo.

Ans 13 (1) When Darwin visited Galapagos islands, He saw various small black birds (called Darwin's finches) which varied in their shape of beak and feeding habit.

(2) He proposed that all birds (different species) developed from the same ancestor who was seed-eating & from the same island they flew off to other islands where according to different environmental conditions and habitats, they adapted to different conditions and developed

different shapes of beaks and feeding habits. For eg:- some became cactus eating, ~~seed~~ insect + fruit ~~eat~~ eating.

3) Adaptive Radiation had occured. It is defined as the process in which different species originate from same ancestor on same habitat starting from one point and litera radiating to different habitats.

Ans 14. Test cross will be used to find the genotype of purple coloured flowed. As purple is dominant over white colour in pea flowers, the offspring has a dominant trait. In Test cross, dominant progeny is crossed with one of the recessive parents to find its genotype.

Here the plant can have 2 genotypes:-

(1) WW (homozygous dominant) where W → dominant allele (purple
(2) Ww (heterozygous dominant) w → recessive allele (white

The following 2 Test crosse's are possible:-

(I) Cross I → Parentes WW (dominant) × ww (recessive parent)

gamets (W) (W) (w) (w)

Punett square.

	W	W
w	Ww	Ww
w	Ww	Ww.

Parents. WW × ww

gametes. (W)(W) (w)(w)

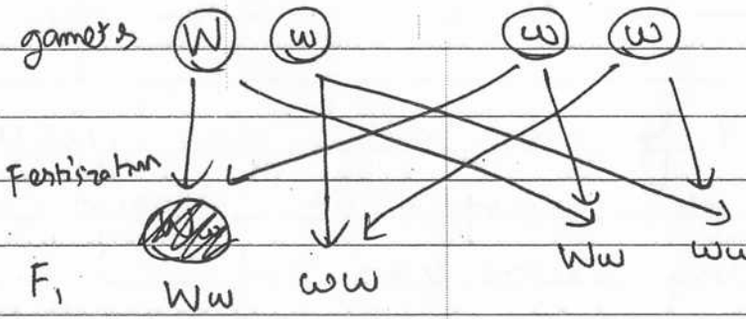
Fertilization

F_1 Ww Ww

Heterozygous

∴ All progeny's are dominant & all have purple coloured flowers. No white coloured flowers are produced.

Cross II → parents Ww × ww (recessive parent)



Punnett square

	W	w
w	Ww	ww
w	Ww	ww.

Ww → Purple

ww → white

∴ Test cross ratio is 1:1

where 50% are purple & 50% white.

Conclusion → If pea plant is homozygous dominant, then it will produce only purple progenies after test cross but if it is heterozygous dominant it will produce

50% purple & 50% white after test cross.

//

Ans 15. (a) Erwin Chargaff's rule the ratio of Adenine to thymine and Guanine to Cytosine is contant and equal to 1 for any species for ds DNA.

Adenine → [A] = [T] ← Thymine ∴ Thymine = 520 nucleotides.

~~[A] = [T]~~

⇒ Total nucleotides − [A] − [T] = [G] + [C]

⇒ 2000 − 520 − 520 = [G] + [C]

⇒ 960 = [G] + [C] (Guanine → [G], Cytosine → [C])

Also ∵ [G] = [C] = $\frac{960}{2}$ = 480

Purines are Adenine & Guanine ∴ [A] + [G] = 520 + 480

∴ Total purines = 1000

50% purple & 50% white after test cross.

//

Ans 15 (a) Erwin Chargaff's rule the ratio of Adenine to thymine and Guanine to Cytosine is constant and equal to 1 for any species for ds DNA.

Adenine → [A] = [T] ← Thymine ∴ Thymine = 520 nucleotides.

⇒ Total nucleotides − [A] − [T] = [G] + [C]

⇒ 2000 − 520 − 520 = [G] + [C]

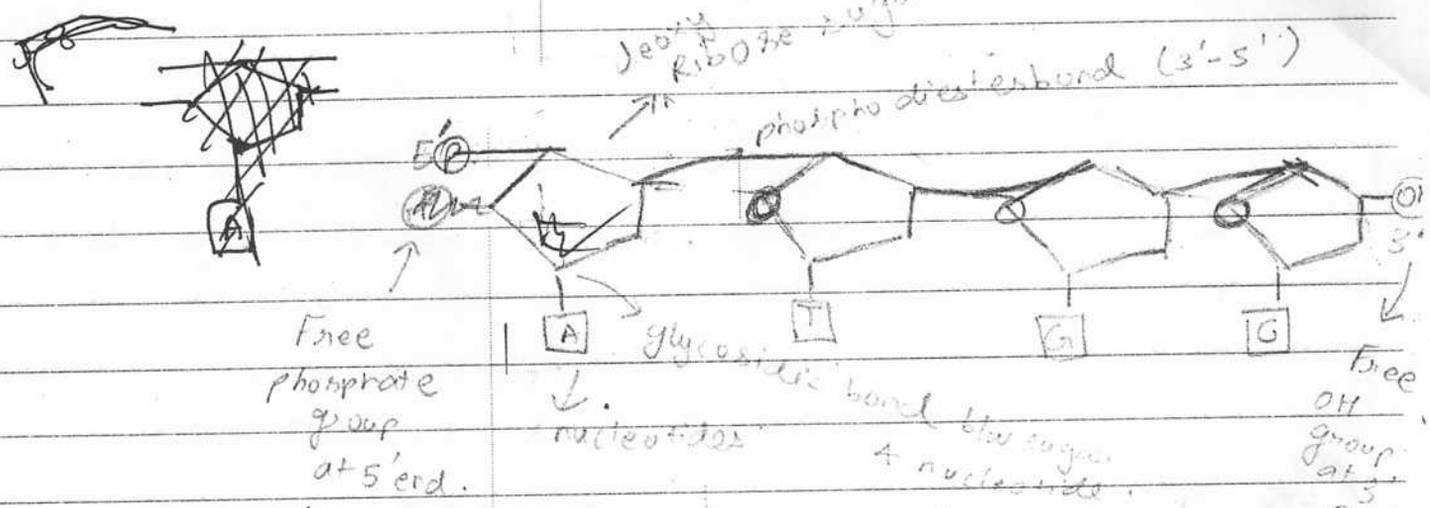
⇒ 960 = [G] + [C] (Guanine, Cytosine)

Also ∵ [G] = [C] = $\frac{960}{2}$ = 480

Purines are Adenine & Guanine ∴ [A] + [G] = 520 + 480

∴ Total purines = 1000

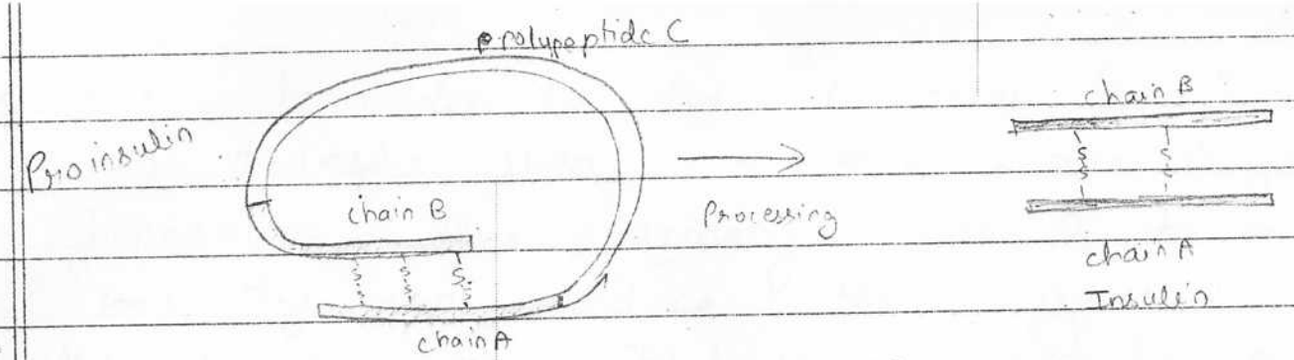
b)



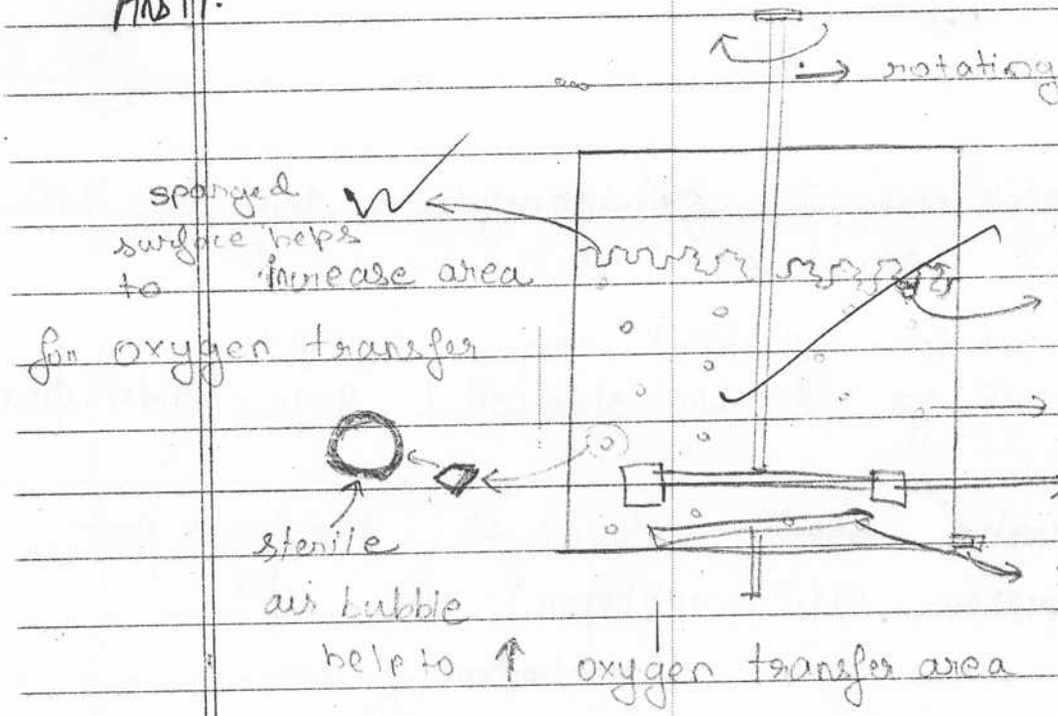
Ans 16. DNA sequences of chain A & chain B → (Inserted separately) → Plasmid of Ecoli (vector) → (Inserted into host) → Ecoli → (After translation) → Polypeptide chain A + Polypeptide chain B produced separately in Ecoli

Polypeptide chain A + Polypeptide chain B produced separately in Ecoli → extracted from Ecoli and processed using downstream processing techniques → Joined by creating disulfide bonds → Mature insulin created.

In 1983, Eli, Lilly an american company produced mature insulin using recombinant DNA technology

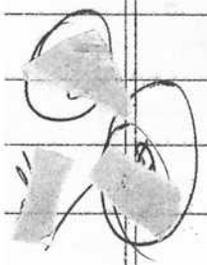


Ans 17.



Sparged stirred tank bioreactor thru which sterile air bubbles are sparged. The advantage

of this bioreactor is that it helps to ↑ oxygen transfer area so that more oxygen can enter the bioreactor. Thus providing more O_2 to microbes so that they can produce the biosynthetic product more efficiently & quickly. Total biomass production ↑es.



Ans 8 → DNA Fingerprinting. It uses satellite DNA showing high degree of polymorphism as probe. It was developed by Alec Jeffreys. It involves Southern blot hybridisation using radiolabelled VNTR (Variable Number of Tandem Repeats) as probe.

→ Principle → It involves identification of specific sequences of DNA (repetitive DNA sequences) which are unique for every individual.

→ Steps :- (1) Isolation of DNA

(2) Fragmentation & Digestion of DNA using Restriction Endonuclease

(iii) Separating of DNA fragments using Gel electrophoresis. (Blotting)

(iv) Transferring of separated fragments to a synthetic membrane like nylon / nitrocellulose.

(v) Hybridization using Radiolabelled VNTR probe.

(vi) Detection by autoradiography.

(vii) The autradiogram will show bands of different sizes. These bands are arranged in a characteristic pattern which is unique to an individual.

(viii) Sensitivity of this technique can be increased by using PCR (Polymerase Chain Reaction). Thus DNA from only 1 cell is required.

Ans 19 (a) Yes, I will report to authorities as consumption of performance enhancing drugs like cannabinoids is illegal and harmful for the health of students. It can lead to Addiction which is psychological attatchment to certain

from previous page / ... Temporary sense of well- ... Perceived benefits of drugs lead to their ...

Drug Dependence → The tendency of body ... a characteristic & unpleasant ~~sy~~ withdr... if regular dose of drug is abruptly discon... to nausea / sweating / anxiety / shakines...

(b) Cannabis sativa

(c) The receptors for cannabinoids are located in brain. These drugs affected cardiovascular system of body. They ↑ heart beat, ↑ performance, ↑ blood flow & ↑ oxygen transfer rate to muscles. The produce a sense of euphoria & a sense of well being. ~~They may result in heat~~ Excess use of these drugs may result in heart attack.

Ans20 (OR) (1) BOD is the amount of oxygen consumed if all organic matter in one litre of water is oxidised by bacteria.

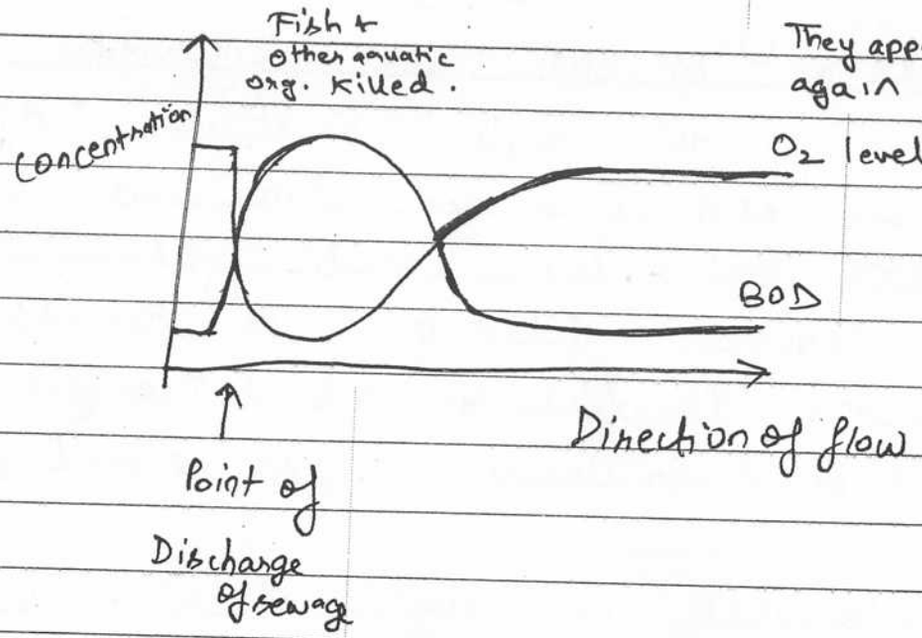
(2) aerobic bacteria consume & ~~degrar~~ decompose organic matter present in sewage. In this process they use consume oxygen. and BOD of water ↑ses. as oxygen gets depleted in water. Thus killing all aquatic Fish and organisms.

(3) ~~As~~ When most of ...

and oxygen level in water ↑ses. Therefore, the aquatic organisms start to appear again.

(3) More polluted the water, more organic matter is present in it, thus more oxygen is required to decompose it, hence more BOD of poluted water.

(4) Higher BOD ~~resul~~ indicates more polluted water.



Q21 → (1) Interbreeding is mating b/w 2 more closely related animals within same breed upto 4-6 generations.

(2) ♀ Superior male & superior male of one breed are choosen and mated.

(3) Their progenys are evaluated and superior male & ♀ progenys are selected and mated. This is continued upto 4-6 generations.

Disadvantages → (1) ~~Close in-breeding~~ Continued inbreeding especially close inbreeding can lead to in breeding depression which results in ↓ in fertility & productivity. It can be overcome by using out-cross.

(2) Close Inbreeding does not ~~lead~~ introduce useful variations present in unrelated animals of same breed or different breed or different species. The genetic variability in offspring ↓ses as very close animals are breeded. Genetic recombinations reduce.

Q22. (1) Mycorrhiza → Mutualistic association b/w Fungi (members of Glomus genus) & roots of higher plants. ~~They~~ Fungi absorb Phosphorus & give it to plant & help to ↑ resistance to root borne pathogens,

tolerance to salinity & drought & ↑ plant growth & productivity.

(ii) Anabaena → Autotrophic cyanobacteria which can fix atmospheric N_2 (in paddy fields) and convert into useful organic comp'd like nitrates & they ↑ organic matter in soil, thus ↑sing fertility of soil.

(iii) Rhizobium → A Symbiotic relationship b/w roots of leguminous plants & rhizobium bacteria which fix (anaerobically) atmospheric N_2 into useful organic compounds like nitrates which are used by plants. It lives in root nodules. ↑ses fertility of soil.

Section-B

Ans 6.

ZZ or ZW	XY
1) Present in birds.	(1) Present in Humans & Drosophilia (fruit fly)
2) ~~F~~ Involves female heterogamety	(2) Involes male heterogamety.
3) ~~spe~~ egg decides the gender of offspring.	(3) sperm decides gender of offspring
4) ♀ produces 2 types of gametes while ♂ produces ~~a~~ 1 type of gamete.	(4) ♂ produces 2 types of gametes while ♀ produces 1 type of gamete

7. (i) In-Vitro fertilization ⇒ Egg from wife / donor & Sperm from husband / donor are taken and made ~~to~~ fertilize outside body in laboratory in suitable conditions. to form zygote ~~The zygote formed~~

(ii) Embryo Transfer → Zygote or embryo upto 8 blastomeres is transfered into fallopian tube by (ZIFT → Zygote into fallopian transfer]. Embryo ~~8~~ greater than

8 blastomeres is transfered to uterus by IUT (Intra Uterine Transfer) for further development.

Ans 8 Many Fresh water animals cannot regulate a constant internal environment & ~~i.e. cannot~~ maintain ~~cont.~~ (osmotic concentration of their body fluids/osmoregulation). The Osmotic conc^n of their body fluids Depend on osmotic conc^n of surrounding water body. i.e. they are conformers. Here marine environments have high salt conc^n. ∴ osmotic conc^n is very high & freshwater fish will die in salty conditions as water will flow from their body to outside & they will not be able to absorb water.

Ans 9
(1) Protein quality & content
(2) Oil quality & content
(3) Vitamin content
(4) Micronutrient & mineral content.

Ans 10
(a) LAB → Lactic acid and converts milk to curd.
(b) Saccharomyces cerevisiae → Yeast ferments bread

(c) Propionibacterium sharmanii → Swiss cheese has holes bcos this bacteria produces CO_2 which make these holes.

(d) Aspergillus niger → citric acid.

Section-D

23(a) Swachh Bharat Abhiyan is very imp for the nation as day by day pollution is ↑ing in our country. Air pollution by automobiles which release toxic fumes & gases in the air are harmful for human beings as they can cause lung disease, cancers, etc Dangerous chemicals like effluents from industries & pesticides & fertilizers from farms are dumped in rivers, ponds, etc where they cause accelerated eutrophication causing pond to turn to land, algal bloom which leads to death of aquatic organisms, & these chemicals seep into the water ground supply & cause many diseases in humans. Dumping of garbage in open burial grounds which serve as breeding ground for rats & flies & burning them releases toxic gases which are harmful to humans. If strict laws are not implement, then the

health of humans & animals / plants will be severly affected
For. eg:- nitrates in drinking water cause, blue baby syndrome,
mercury → minamata disease, Cd → itai-itai disease.

(b) 2 problems are :-

(1) Garbage separation :- To maintain cleanliness garbage should not be burned (as it releases poisonous gases) or stored in open burial ground (b. serve as breeding ground for rats & flies). In sanitary landfills, the chemicals may seep into the water supply & cause pollution. ∴ The problem faced would be convincing people of my locality to separate their garbage into biodegradable, non-biodegradable & recyclable parts. Also e-wastes (old computers, mobiles) etc should not be incinerated or buried.

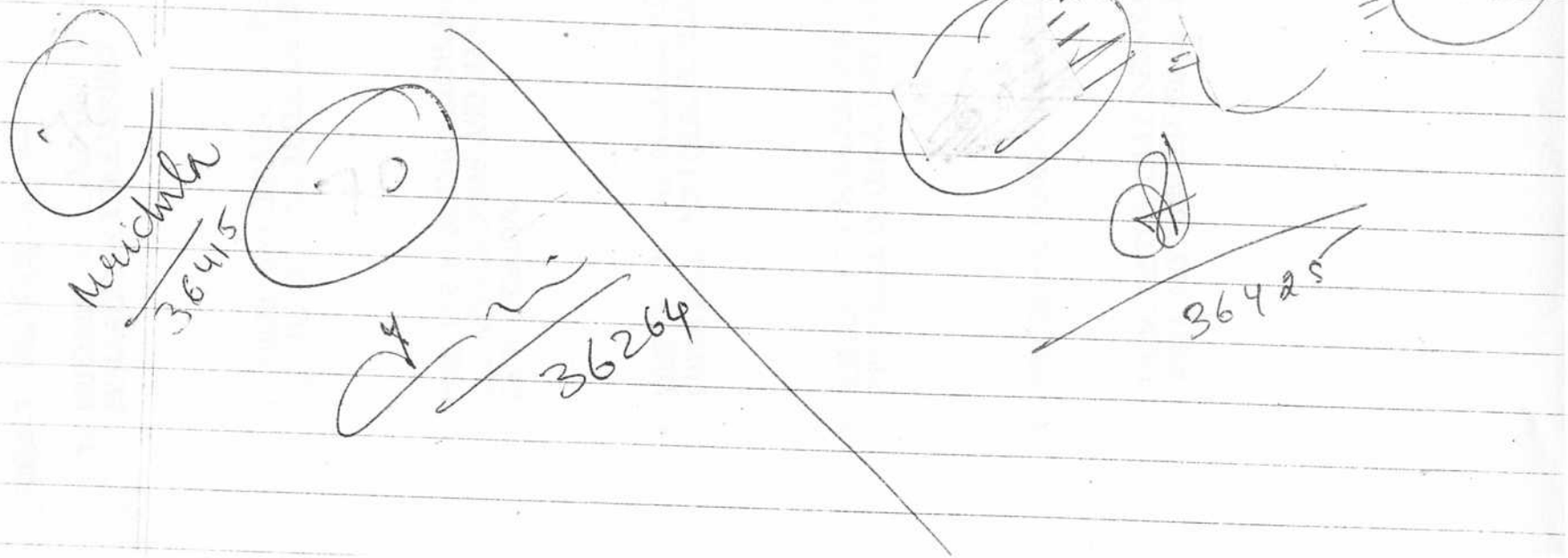
(2) Automobile pollution & Sanitary disposable of human waste — Automobiles release lot of air pollutants & poisonous gases which cause air pollution & cancers & other diseases in humans.
I would face the problem of convincing

petrol + diesel or more safer CNG. Also ~~for~~ sanitary disposal of faecal matter is must + as it may contaminate are water + food supply causing diseases like amoebic dysentry, typhoid, ~~chlorea~~ cholera, ascariasis. It would difficult for me to ~~convince~~ convince the people to ~~dispose~~ use ecosan toilets for sanitary disposable of human waste. Also. I would have ~~to convince~~ convince Municipality to build ecosan toilets for poor.

(1) I would ~~*~~ encourage ~~poe poor~~ people to segragate their garbage into biodegradable, non-biodegradable + recyclable parts. e-wastes should be sent to recycling plants where recycling is done in safe + environmental safe manner. I ~~The~~ Vegetable, Fruit + other dead organic waste would be used ~~f~~ as manure after decomposition. Paper, etc will be recycled.

(2) I would encourage people to put catalytic converters ... to CNG as it is cheaper.

safer, & more effective fuel. I would help in building ~~are~~ help in ~~toite~~ toilets which ~~are~~ sustainable disposal of human waste. ~~They ca~~ using dry compositing toilets. are cost-effective, hygienic, practical & efficient to dispose human waste. The left behind slurry can be used ~~as m~~ as manure & or for biogas produc



CENTRAL BOARD OF SECONDARY

(REGIONAL OFFICE DELHI

REPORT OF THE SUBJECT EXPERT

OBSERVATION/REPORT OF EXAMINER ON THE EVALUATION OF ANSWER BOOK IN THE

SUBJECT Biology (044) ID NO. 2045819

1. WHETHER ALL THE QUESTIONS ATTEMPTED BY THE CANDIDATE ARE EVALUATED BY THE EXAMINER YES

2. IS THERE ANY UNASSESSED PORTION OF ANSWER LEFT OUT, IF YES THE QUESTION NO. AND AFTER ASSESSMENT THE MARKS AWARDED.

NO

3. WHETHER MARKING SCHEME WAS FOLLOWED PROPERLY WHILE EVALUATING THE ANSWER BOOK AND MARKS ARE AWARDED AS PER MARKING SCHEME TO EACH QUESTION. YES

4. WHETHER MARKS ALLOTTED FOR ANSWERS ARE POSTED CORRECTLY ON THE COVER PAGE AND TOTAL OF MARKS ON COVER PAGE IS CORRECT.

YES

5. WHETHER A/BOOKS HAS BEEN EVALUATED AS PER THE QUESTION PAPER SET AS PRESCRIBED IN THE A/BOOKS OF THE CANDIDATES.

YES

6. WHETHER A/BOOK CAN BE UPLOADED ON THE NET. YES/NO