

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

विषय Subject : <u>Biology</u>		
विषय कोड Subject Code : <u>044</u>		
परीक्षा का दिन एवं तिथि Day & Date of the Examination : <u>Monday, 23<sup>rd</sup> March, 2015</u>		
उत्तर देने का माध्यम Medium of answering the paper : <u>ENGLISH</u>		
प्रश्न पत्र के ऊपर लिखे कोड को दर्शाए : Write code No. as written on the top of the question paper :	Code Number <u>57113</u>	Set Number ① ② ● ④
अतिरिक्त उत्तर-पुस्तिका (ओं) की संख्या No. of supplementary answer -book(s) used	<u>nil</u>	
विकलांग व्यक्ति : Person with Disabilities :	हाँ / नहीं Yes / No	<u>No</u>
किसी शारीरिक अक्षमता से प्रभावित हो तो संबंधित वर्ग में ✓ का निशान लगाएँ। 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 Challenged S = Spastic, C = Dyslexic, A = Autistic		
क्या लेखन - लिपिक उपलब्ध करवाया गया : Whether writer provided :	हाँ / नहीं Yes / No	<u>-</u>
यदि दृष्टिहीन हैं तो उपयोग में लाए गये सॉफ्टवेयर का नाम : If Visually challenged, name of software used :	<u>-</u>	

\*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

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044 / 04732

### Section - E

Ans 26 (a) As 200 viable seeds are being produced  $\therefore$  200 ovules should be present as 1 seed is formed by fertilization b/w 1  $\sigma$  & 1 pollen grain + 1 ovule.

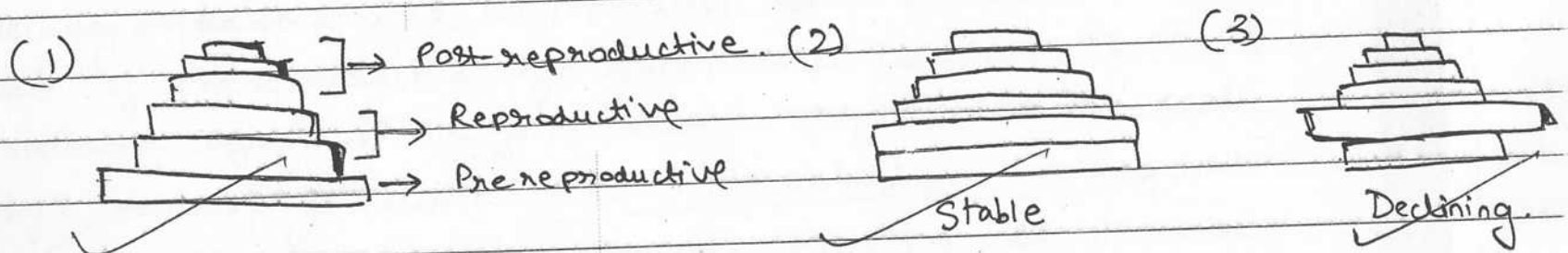
(b) As 200 viable seeds are produced  $\therefore$  200 pollen grains are required  $\therefore$   $\frac{200}{4} = \underline{50}$  microspore mother cells are required as  $\frac{1}{4}$  1 pollen grain develops from 1 microspore + 1 microspore mother cell forms 4 microspores. (microspore tetrad) by 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.  $\therefore$   
 $200 \times 2 = \underline{400}$  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 microphytes region. ~~As~~ As 200 ovules are being used  $\therefore$  200 MMC will be required. Each MMC undergoes meiosis to form ~~one~~ 4 megaspores out of which 3 degenerate while 1 develops into embryo sac which contains 1 egg cell.

ANS 25. At a given 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  $\sigma$  &  $\text{♀}$  in same pyramid. 3 types of age pyramids are:-



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 ↑ing with time as individuals who are pre-reproductive age group <sup>are</sup> more than in reproductive age group.

So with time, the country's population will ↑. Government should take measures to control the country population like <sup>distribution</sup> of contraceptives, sex education, one child policy, etc. <sup>incentive to small families + couples with one children.</sup> Otherwise due to ↑ing population the country's 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. ~~then~~ The government should ensure that country's population does not ↑ or ↓ either due to natural calamities, <sup>or resource</sup> health, job, education depletion. They should make plans for equal resource distribution & opportunities for all.

Case III → In case of declining ~~popul~~ age pyramid, the population ~~not~~ 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. ~~or~~ otherwise

with time the country's 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  $I^A, I^B, i$  ~~the other  $I^A$~~

~~(2) This is a gene~~

(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~~ kind of sugars present is controlled by gene  $I$ .

(4)  $I^A + I^B$  alleles produce slightly different kind of sugars ~~like~~ (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  <sup>$I^A I^B$</sup>  are present together, they ~~proo~~ both express themselves and produce their phenotypes. ~~ie.~~ 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. 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:- *Drosophila 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 & 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 moths ↑ in numbers.

ANS. 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 phenotype & genotype. thru variations & mutation.

### Section - C

Ans 11 (1) Parturition is the process of delivery of fully developed foetus or ~~the~~ 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 <sup>oxytocin</sup> ~~oxytocin~~ from the mother's pituitary. ~~The~~ This acts on



uterine muscles, making the contractions <sup>h</sup> 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 ~~primary~~ central cell develops to form primary endosperm cell which contains <sup>triploid</sup> primary endosperm nucleus.

(2) The primary endosperm cell undergoes successive cell division to form triploid endosperm which has abundant food reserves.

(3) The primary endosperm nucleus undergoes successive nuclear divisions to form <sup>many free nuclei</sup> ~~free nuclear endosperm~~. After ~~event~~ this type of endosperm development is called free nuclear endosperm. After ~~with cell~~ which cell walls are ~~not~~ laid, and

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

→ The endosperm development precedes that of zygote.

to ensure that endosperm containing abundant food reserves is formed earlier and can nourish the developing embryo.

Ans 3 (1) When Darwin visited Galapagos islands, he saw various <sup>small</sup> 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, ~~some~~ insect + fruit eat eating.

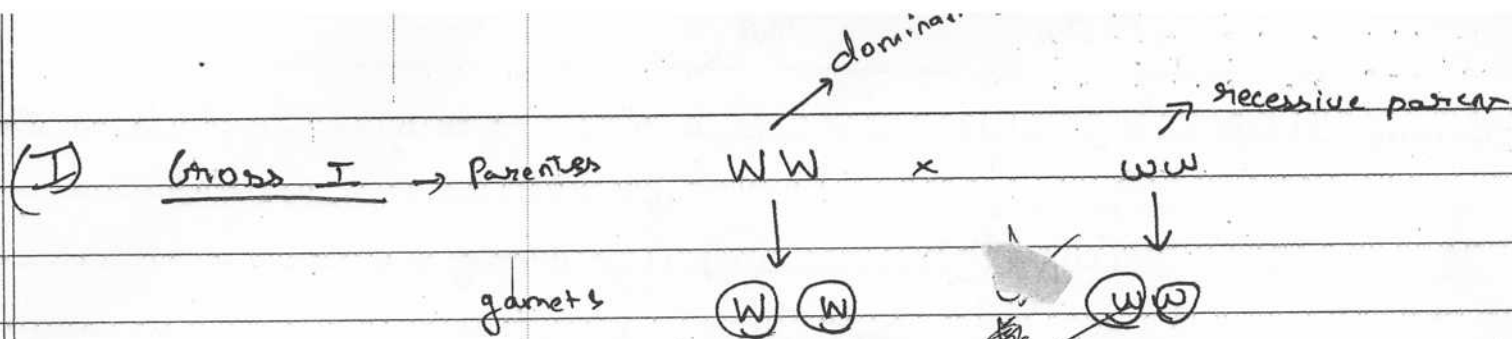
3) Adaptive Radiation had occurred. It is defined as the process in which different species originate from same ancestor on same habitat starting from one point and later radiating to different habitats.

Ansly. Test cross will be used to find the genotype of purple coloured flower. As  $\text{P}$  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  $\text{P}$  can have ~~to~~ 2 genotypes:-

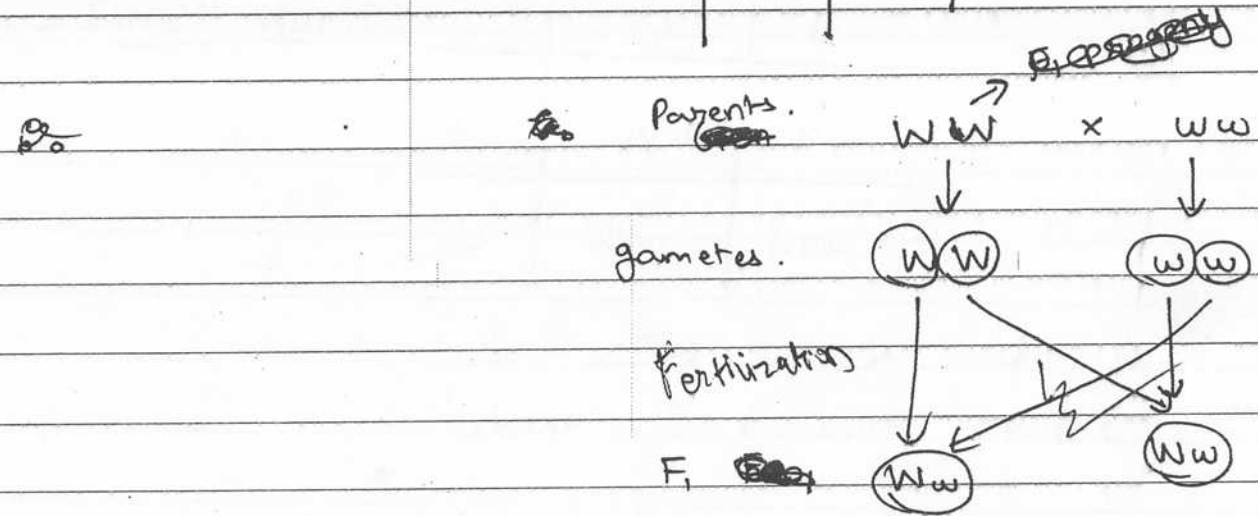
- (1)  $\text{WW}$  (homozygous dominant) where  $\text{W} \rightarrow$  dominant allele (purple)  
(2)  $\text{Ww}$  (heterozygous dominant)  $\text{w} \rightarrow$  recessive allele (white)

The following 2 Test crosses are  $\text{P}$  possible:-



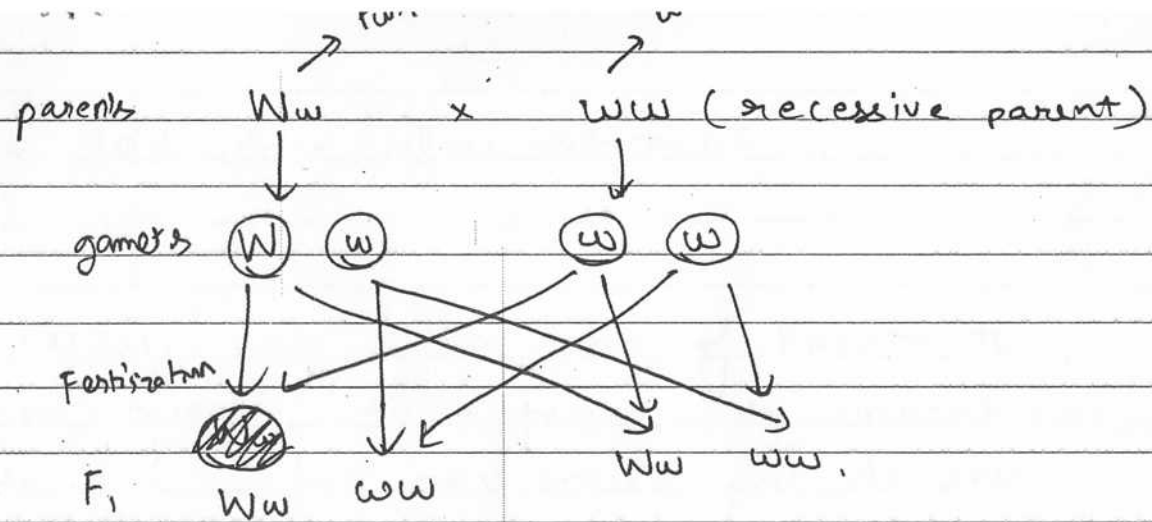
Punnett square.

	W	W
w	Ww	Ww
w	Ww	Ww



∴ All progeny's are <sup>Heterozygous</sup> dominant & all have purple coloured flowers. No white coloured flowers are produced.

Cross II →



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.

11

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.

$\xrightarrow{\text{Adenine}}$   
 $[A] = [T]$       $\xrightarrow{\text{Thymine}}$       $\therefore$  Thymine = 520 nucleotides.

~~2000 - [A] - [T] = [G] + [C]~~

$\Rightarrow$  Total nucleotides - [A] - [T] = [G] + [C]

$\Rightarrow$  2000 - 520 - 520 = [G] + [C]

$\Rightarrow$  960 = [G] + [C]      $\xrightarrow{\text{Guanine}}$       $\xrightarrow{\text{Cytosine}}$

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

Purines are Adenine & Guanine  $\therefore [A] + [G] = 520$

+480  
~~1000~~  
~~500~~

$\therefore$  Total purines = ~~1000~~ ~~980~~ ~~980~~ 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.

$$\begin{array}{c} \text{Adenine} \quad \text{Thymine} \\ \nearrow \quad \nearrow \\ [A] = [T] \end{array} \quad \therefore \text{Thymine} = 520 \text{ nucleotides.}$$

~~2000 - [A] - [T] = [G] + [C]~~

$$\Rightarrow \text{Total nucleotides} - [A] - [T] = [G] + [C]$$

$$\Rightarrow 2000 - 520 - 520 = [G] + [C]$$

$$\Rightarrow 960 = [G] + [C] \quad \begin{array}{c} \nearrow \text{Guanine} \quad \nearrow \text{Cytosine} \end{array}$$

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

Purines are Adenine & Guanine  $\therefore [A] + [G] = 520$

+ 480

1000

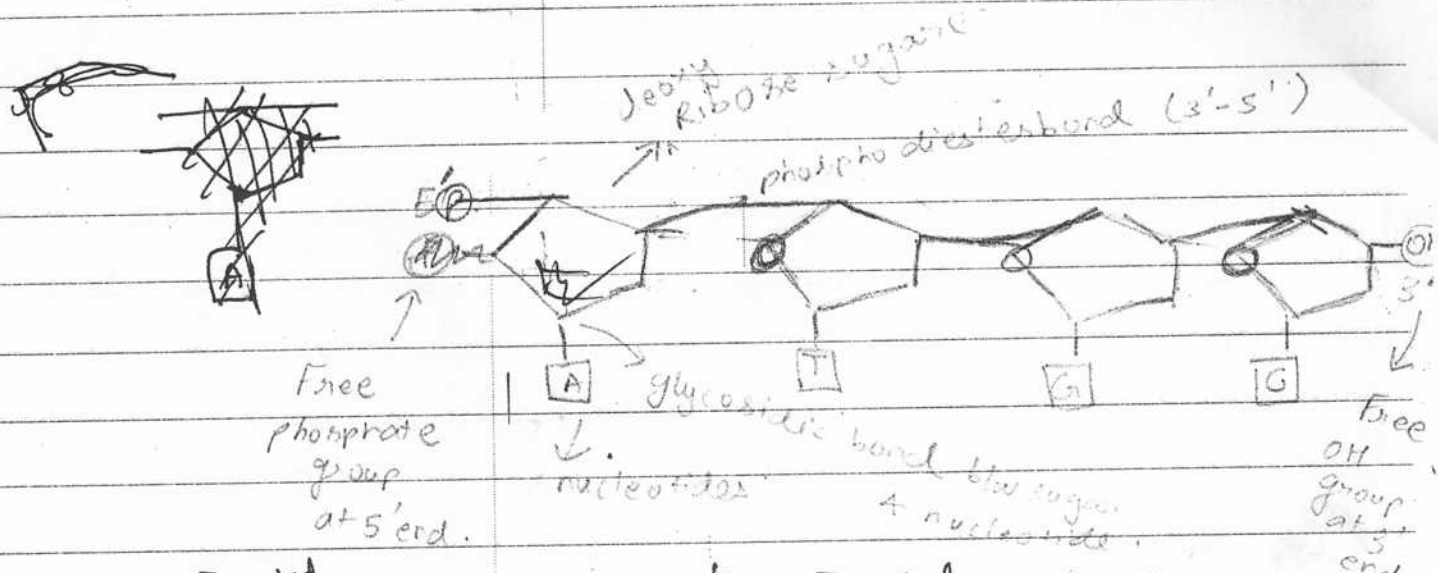
$\therefore$

Total purines =

~~2000~~ ~~960~~ ~~480~~

1000

b)



Ans 16. DNA sequences of chain A & chain B

Inserted separately

Plasmid of E. coli (vector)

Inserted into host

E. coli

→ After translation

Polypeptide chain A

+ Polypeptide chain B produced separately in E. coli

Joined by creating disulfide bonds

extracted from E. coli and processed using downstream processing techniques

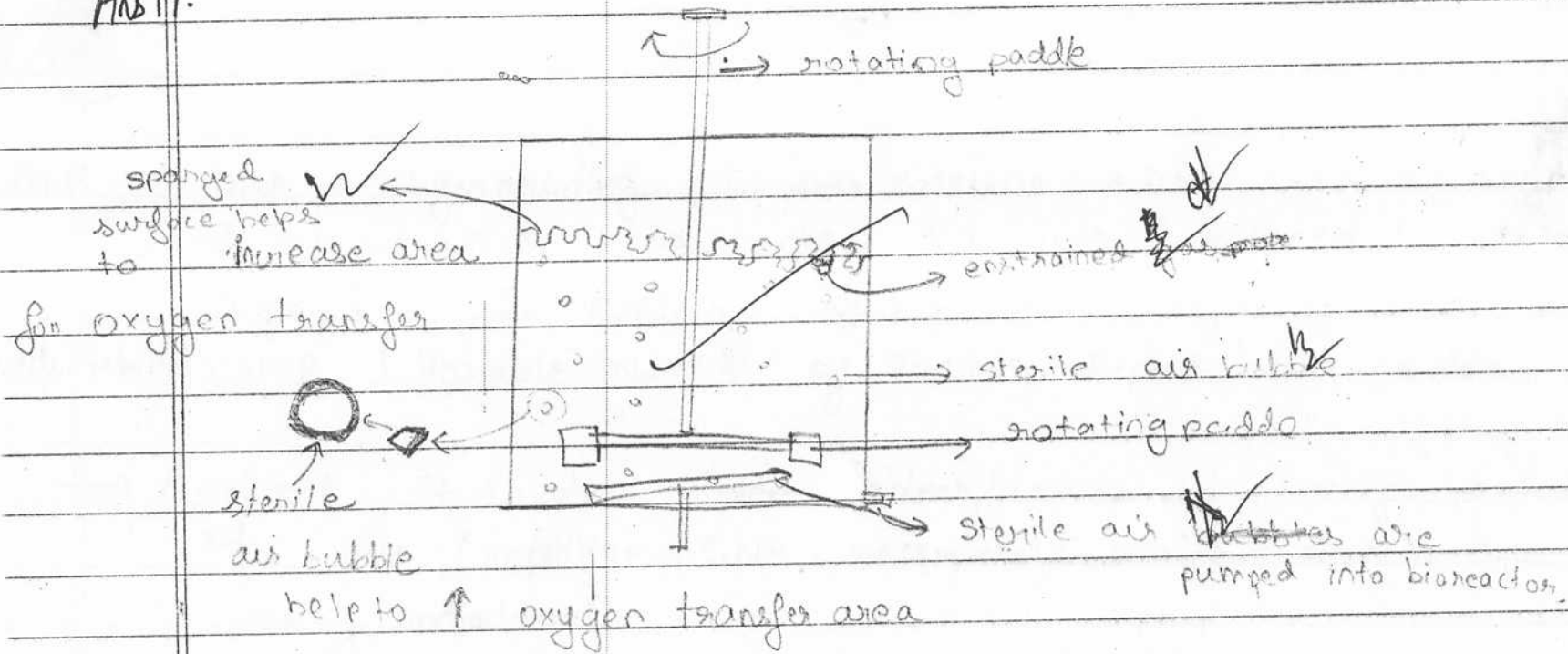
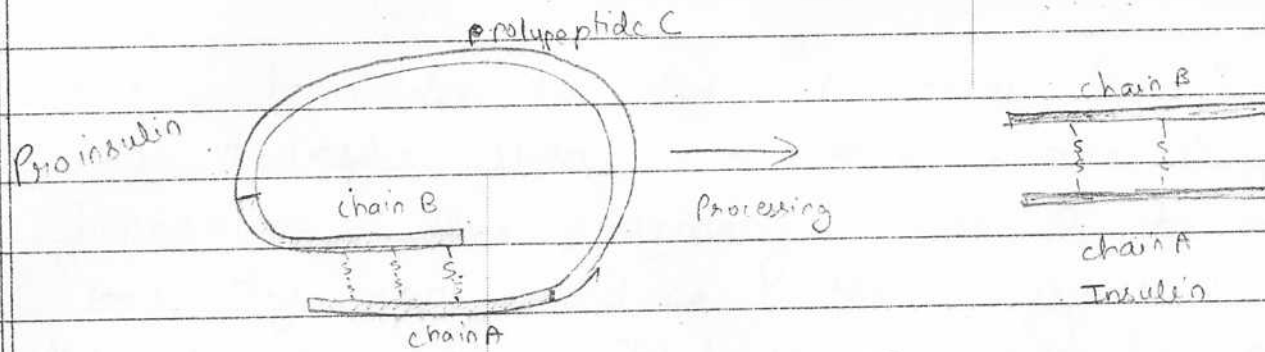
Mature insulin created

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 ~~str.~~ transfer area so that more oxygen can enter the bioreactor. Thus providing more  $O_2$  to ~~the~~ microbes so that they can produce the biosynthetic product more efficiently & quickly. Total biomass production ↑.

ANS → DNA Fingerprinting. It uses satellite DNA showing high degree of polymorphism as probe. It was developed by Alec Jeffrey. 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:- (i) Isolation of DNA  
(2) Fragmentation & Digestion <sup>of DNA</sup> using Restriction Endonuclease

(iii) Separating of DNA fragments using gel ~~at~~ electrophoresis. (Blotting)

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

(v) Hybridization using radiolabelled VNTR <sup>H<sub>2</sub></sup> probe.

(vi) Detection ~~of~~ by ~~autorad~~ autoradiography.

(vii) The autoradiogram 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 ↑ 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 attachment to certain

can Perceived benefits of drugs lead to their temporary sense of well-

Drug Dependence → The tendency of body a characteristic & unpleasant ~~by~~ withdrawal if regular dose of drug is abruptly discontinued to nausea / sweating / anxiety / shakiness

(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 <sup>to muscles.</sup> rate. They produce a sense of euphoria & a sense of well being. They may result in ~~heart~~ Excess use of these drugs may result in heart attack.

Ans 20 (OR) (1) BOD is the amount of oxygen consumed if all organic matter in one litre of water is oxidised by bacteria.

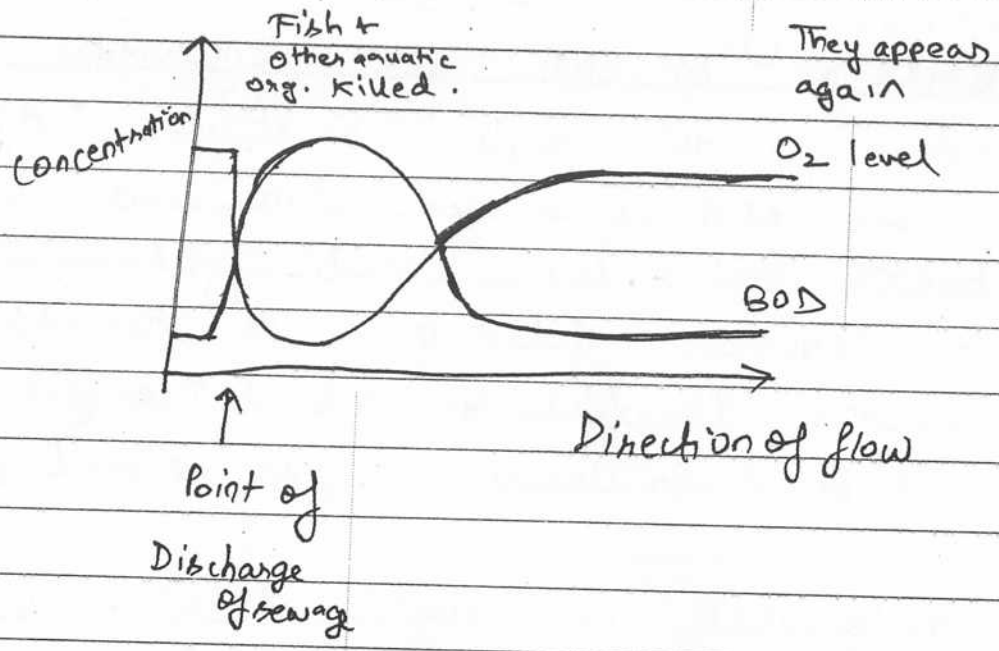
(2) Aerobic bacteria consume & ~~degrade~~ decompose organic matter present in sewage. In this process they use consume oxygen. and BOD of water ↑'s. as oxygen gets depleted in water. Thus killing all aquatic fish and organisms.

(3) ~~As~~ When most of

and oxygen level in water rises. 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 polluted water.

(4) Higher BOD level indicates more polluted water.



Q21 → (1) Inbreeding is mating b/w more closely related animals ~~not~~ within same breed upto 4-6 generations.

(2) Superior male & superior female of one breed are chosen and mated.

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

Disadvantages → (1) ~~Inbreeding~~ continued inbreeding especially close inbreeding can lead to depression in breeding depression which results in  $\downarrow$  in fertility & productivity. It can be overcome by using out-cross.

(2) Close Inbreeding does not introduce variations useful.

present in unrelated animals of same breed or different breed or different species. The genetic variability in offspring varies as very close animals are bred. Genetic recombinations (members of *Glomus* genus) produce.

Q22. (1) Mycorrhiza → Mutualistic association b/w Fungi & roots of higher plants. ~~They~~ absorb Phosphorus & give it to plant & help to resist 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 compounds like nitrates & they ↑ organic matter in soil, thus emitting fertility of soil.

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

~~Set~~

Section-B

ZZ or ZW

X Y

Ans 6

- 1) Present in birds.
- 2) Involves female.
- (1) Present in Humans & Drosophila (fruit fly).
- (2) Involves male heterogamety.

(3) Sperm decides the gender of offspring

(4) produces 2 types of gametes while  
 produces 1 type of gamete

of gametes while  
 produces 1 type of gamete.

(1) In-Vitro fertilization  $\Rightarrow$  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  $\rightarrow$  zygote or embryo upto 8 blastomeres is transferred into fallopian tube by CZIT  $\Rightarrow$  zygote

Embryo transfer is greater than



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

Ans 8 Many Fresh water animals cannot regulate a constant internal environment & ~~is~~ ~~cannot~~ maintain ~~an~~ ~~cont.~~ (osmotic concentration of their body fluids/osmoregulation). The osmotic conc<sup>n</sup> of their body fluids depend on osmotic conc<sup>n</sup> of surrounding water body. i.e. they are conformers. Here marine environments have <sup>high</sup> salt conc<sup>n</sup>. ∴ osmotic conc<sup>n</sup> is very high & freshwater fish will die in salty conditions as water will <sup>flow</sup> 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  $\text{CO}_2$   
which make these holes.

(d) *Aspergillus niger* → Citric acid.

#### Section-D

(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 severely 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 <sup>poisonous</sup> gases) or stored in open burial ground (to 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 disposal 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

in car. lead speed

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

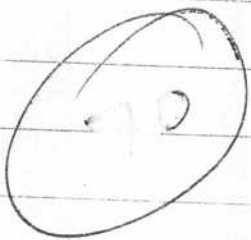
2) (1) I would ~~encourage~~ encourage ~~poor~~ poor people to segregate their garbage into biodegradable, non-biodegradable & recyclable parts. E-wastes should be sent to recycling plants where recycling is done in safe & environmental safe manner. ~~I~~ Vegetable, Fruit & other dead organic waste would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

(2) I would encourage people to put catalytic converters.

safer, & more effective fuel. I would help in building  
 toilets which ~~are~~ <sup>are help in</sup> sustainable disposal of human  
 waste. They ~~can~~ <sup>are</sup> using dry composting toilets.  
 are cost-effective, hygienic, practical & efficient  
 to dispose human waste. The left behind slurry  
 can be used ~~as~~ <sup>as</sup> manure & or for biogas production.



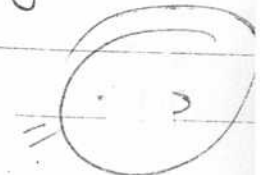
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CENTRAL BOARD OF SECONDARY EDUCATION  
(REGIONAL OFFICE DELHI)

REPORT OF THE SUBJECT EXPERT  
OBSERVATION/REPORT OF EXAMINER ON THE EVALUATION OF ANSWER BOOK IN THE  
SUBJECT Biology (OHU) 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

7. I ALSO CERTIFY THAT INFORMATION GIVEN ABOVE IS BEST OF MY KNOWLEDGE AND IF ANY THING FOUND INCORRECT I WILL BE RESPONSIBLE FOR THAT.

Bsm  
SIGNATURE OF THE EXAMINER

NAME OF EXAMINER Bikram Singh

EX NO. FOR 2015 EXAM. 35917

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Delhi '32

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