

BIOLOGY

SECTION – A

A.	B	B	A	D	A	A	A	D	C	C
Q.	11	12	13	14	15	16				
A.	D	B	D	B	A	A				

[16 × 1]

SECTION – B

17. If the testes fail to descend to the scrotum, gametogenesis could be inhibited. The process of spermatogenesis requires a marginally lesser (2°C less) ambient temperature than that in the abdominal cavity. [2]
18. (i) To determine the real or biological parents in case of disputes. [1+1]
 (ii) To identify racial groups to rewrite the biological evolution.

OR

The exaggerated response of the immune system to certain antigens present in the environment is called allergy. [1+1]

Allergens are mites in dust, pollens, animal dander.

19. The abnormal response of an immune system in which it fails to recognise 'self and 'non-self' and start destroying its own cells and molecules is called autoimmune disease. Rheumatoid is an example of autoimmune disease which destroys articular cartilage and fusing bones. [1+1]
20. (1) Exonucleases: It removes nucleotides from the ends of the DNA. [1+1]
 (2) Endonucleases: It makes cuts at specific positions within the DNA.
21. (i) Does not take into account same species belonging to two or more trophic levels. [2]
 (ii) Assumes simple food chain, does not accomodate food web.
 (iii) Saprophytes have not been given any place in ecological pyramids.

SECTION – C

22. (i) Germinal epithelium have two types of cell. 1. Spermatogonium. 2. Sertoli cells.
 (ii) Leydig cells or Interstitial cells.
 (iii) Functions Spermatogonium undergoes meiotic division leading to sperm formation.
 Sertoli cell : Nourishes germ cells. [1+1+1]
23. (a) The level of pituitary gonadotropins, follicle-stimulating hormone and luteinising hormone increase steadily.
 (b) The endometrium is regenerated and it has thickened further.
 (c) Following ovulation, the remaining parts of the ruptured follicle forms the Corpus luteum. The Corpus luteum secretes a large quantity of progesterone. [1+1+1]

24. Contraceptive methods : A wide range of contraceptive methods are presently available which could be broadly grouped into the following categories, namely: [3]

- (1) **Natural (Traditional) :** (a) Periodic Abstinence, (b) Coitus interruptus (withdrawal method), (c) Lactational amenorrhoea.
- (2) **Barrier -** (a) Condoms, (b) Diaphragms, Cervical Caps and Vault Caps. On Chemical Methods (Spermicides)
- (3) **IUDS -** (a) Non-medicated IUD, (b) Copper releasing IUD/IUCDs, (c) Hormone releasing IUD.
- (4) **Oral Contraceptives (Oral Pills) -** (a) Combined Pills, (b) Mini Pills.
- (5) Subcutaneous Implants (Norplant).
- (6) Hormonal Injections (Depo-Provera)
- (7) Emergency Contraceptives
- (8) Sterilization (Surgical methods)

OR

Intra Uterine Device.

[1+2]

Types of IUDs :

- Non medicated IUDs : Lippes loop.
- Copper releasing IUDs : CuT, Cu7, Multiload 375.
- Hormone releasing IUDs : Progestasert, LNG-20.

- 25.** (i) Disruptive selection
- (ii) Here, the extreme have more adaptable phenotypes than the average ones. Consequently, the original population is disrupted into two and more separate groups that latter evolve into new species.
- (iii) Charles Darwin. [1+1+1]

26. In modern society, to combat plant diseases, chemicals are used. The chemicals used are poisonous and harmful to humans and the environment. In farming, a pest control method depends on natural predation, like controlling butterflies, caterpillars, and other insects. *Bacillus thuringiensis* is a bacteria provided as dried spores in sachets to be mixed with water and then sprayed onto sensitive plants such as brassicas, where larvae are consumed. The toxin is then released in the intestines of larvae by killing them. The bacterial sickness will kill the caterpillar but does not harm other insects. [3]

27. Benefits of producing GMOs :

- (i) GM crops produce desired phenotypic traits in crop plants.
- (ii) The genes responsible for production of specific proteins are inserted into GM crops. These crops then produce that specific protein.
- (iii) Transgenic crops synthesizes new end product of specific biochemical pathway.
- (iv) These crops also help in preventing expression of existing native Gene.

Drawbacks of producing GMOs :

- (i) Transgenic crops may endanger wild & native species.
- (ii) GM crops may cause health problems by supplying allergens.
- (iii) GM crops may damage to the natural environment.

[1½+1½]

28. Alexander Von Humboldt has observed that within a region, species richness increased with increase explored area but only upto a limit thus the relationship between species richness & area for anumber of taxa is found to be a rectangular hyperbola. On a log scale, the relation ship becomes linear & is described equation

$$\log S = \log C + Z \log A$$

The values of slope of regression are identical regardless of the taxonomic group or the region. When such analysis is made among very large areas, the slope of regression would be much steeper. [2+1]

SECTION – D

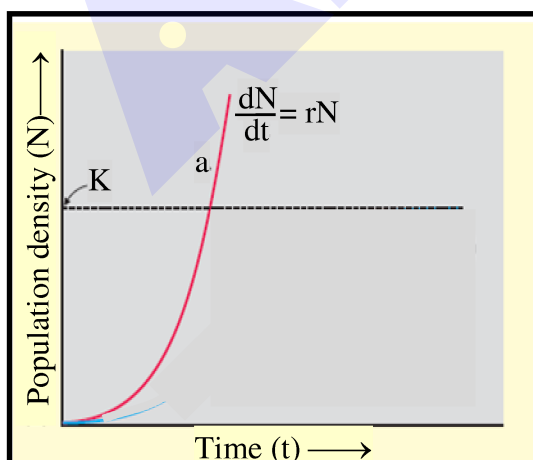
29. (i) a—gene for ampicillin resistance
d—gene for tetracycline resistance.
- (ii) The insertion of rDNA into the coding sequence of an enzyme β -galactosidase leads to the inactivation of the enzyme. This is called insertional inactivation. The recombinants do not produce blue-coloured colonies in the presence of chromogenic substrate while the non-recombinants produce a blue colour. Thus, coding sequence of β -galactosidase is a better marker.
- (iii) Selectable markers are essential to identify and eliminate non-transformants, by selectively permitting the growth of the transformant.

OR

Ampicillin

[1+2+1]

30. (a) Exponential or geometric growth pattern
- (b) $N_t = N_0 e^{rt}$
Where N_t = population density after time t
 N_0 = Population density at time zero
 r = intrinsic rate of natural increase
 e = the base of natural logarithms
- (c)

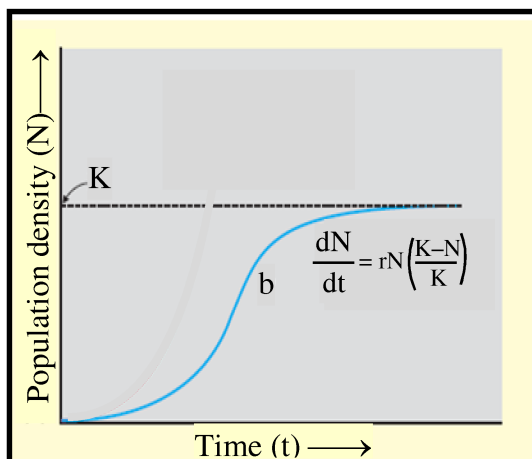


J- shaped growth curve

[1+1+2]

OR

Logistic growth - sigmoid shape, will be obtained. In the logistic growth, the population increases at the onset and continues exponentially till the mid when the resources are utilized at maximum level. The graph becomes stationary when the population exceeds its carrying capacity.



SECTION – E

31. (i) The signals for parturition originate from the fully developed foetus and the placenta which induce mild uterine contractions called foetal ejection reflex. [2+1+2]
- (ii) Oxytocin
- (iii) The average duration of human pregnancy is about 9 months which is called the gestation period. Vigorous contraction of the uterus at the end of pregnancy causes expulsion/delivery of the foetus. This process of delivery of the foetus (childbirth) is called parturition.

OR

- (i) **I. NATURAL METHODS:** avoiding chances of meeting between the gametes.
- Periodic Abstinence : couples avoid coitus from 10-17th day of menstrual cycle when ovulation is expected.
 - Lactational Amenorrhoea: absence of menstruation during intense lactation.
- II. BARRIER METHODS:-** ovum & sperms are prevented from coming closer with the help of barriers.
- Condoms:- barriers made up of thin rubber or latex sheath to cover penis in males or cervix in females.
 - Diaphragms cervical caps:- made up of rubber & are reusable.
 - Spermicidal creams along with these barriers.
- III. SURGICAL METHODS:-** blocks transport of gametes & thereby conception.
- **Vasectomy** : small portion of vas deferens is removed or tied up through incision in scrotum.
 - **Tubectomy** : small portion of fallopian tube is removed or tied up through vagina.
- (ii) Amniocentesis is the prenatal diagnosis in which sample of amniotic fluid from womb of a pregnant women is taken during early stages of foetal development, the cells are cultured & analyzed to determine the sex of foetus. [1+1+1+2]

32. An operon is a group of connected genes that controls genes involved in protein synthesis. A functional unit of DNA, it is regulated by a single promoter. It has controllers and structural genes which control lactose or lac operon catabolism. A lac operon has the following components -

- The DNA strand responsible for transcribing mRNA.
- Repressor protein encoding regulator gene.
- Inducer that prevents repressor binding to the operator.
- Operator, a DNA region where the repressor protein interacts that is close to the promoter.

Promoter which is the starting site of transcription. RNA polymerase binds at the promoter. A quantifiable increase in the expression in response to an enhancer, inducer or positive regulator is known as an inducible operon. An example is the lac operon of *E. coli*. [2+3]

OR

Human Genome Project (HGP) was called a mega project.

Human genome is said to have approximately 3×10^9 bp, and if the cost of sequencing required is US \$ 3 per bp (the estimated cost in the beginning), the total estimated cost of the project would be approximately 9 billion US dollars.

The enormous amount of data expected to be generated also necessitated the use of high speed computational devices for data storage and retrieval, and analysis. HGP was closely associated with the rapid development of a new area in biology called Bioinformatics.

Goals of HGP

Some of the important goals of HGP were as follows :

- (i) Identify all the approximately 20,000-25,000 genes in human DNA;
- (ii) Determine the sequences of the 3 billion chemical base pairs that make up human DNA;
- (iii) Store this information in databases;
- (iv) Improve tools for data analysis;
- (v) Transfer related technologies to other sectors, such as industries;
- (vi) Address the ethical, legal, and social issues (ELSI) that may arise from the project. [2+3]

33. (a) AIDS (Acquired immuno deficiency syndrome)
- (b) HIV (Human Immuno deficiency Virus)
- (c) Helper T-cells, macrophages, B-lymphocytes.
- (d) Preventive measures :
1. People should be educated about AIDS transmission.
 2. Disposable needles and syringes should be used.
 3. Sexual habits should be changed immediately.
 4. High-risk groups should be discouraged from donating blood.
 5. Routine screening may be done. [1+1+1+2]

OR

Innate immunity is non-specific type of defence, that is present at the time of birth. This is accomplished by providing different types of barriers to the entry of the foreign agents into our body. Innate immunity consist of four types of barriers. These are -

- (1) Physical barriers: Skin on our body is the main barrier which . prevents entry of the micro-organisms. Mucus coating of the epithelium lining the respiratory, gastrointestinal and urogenital tracts also help in trapping microbes entering our body.
- (2) Physiological barriers: Acid in the stomach, saliva in the mouth, tears from eyes-all prevent microbial growth.
- (3) Cellular barriers: Certain types of leukocytes (WBC) of our body like polymorpho-nuclear leukocytes (PMNL-neutrophils) and monocytes and natural killer (type of lymphocytes) in the blood as well as macrophages in tissues can phagocytose and destroy microbes.
- (4) Cytokine barriers : Virus-infected cells secrete proteins called interferons which protect non-infected cells from further viral infection.

[1+1+1+1+1]