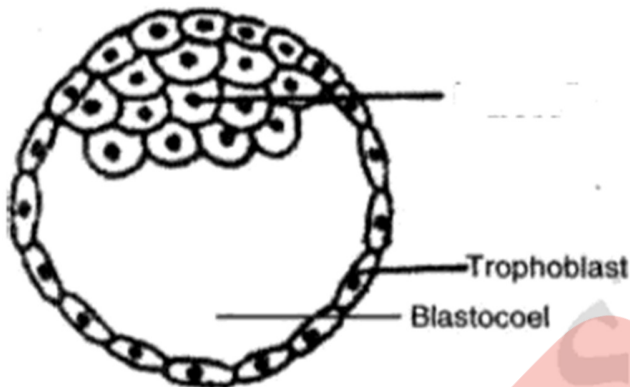


**Solution**  
**PRACTICE Paper 02 (2020-21)**  
**Class 12**  
**Biology**

**Section A**

1. Chorionic villi and inner wall layer of the uterus take part in the formation of the placenta in foetus.
2. Name of stage: Blastocyst



3. The proportion of parental gene combinations would be much higher than non-parental types when the two genes in a dihybrid cross are closely situated on the same chromosome and show very little crossing over. The phenomenon of physical association of genes on a chromosome is called incomplete linkage.
4. Death rate = Number of individuals dead / Total number of individuals  
= 8 / 80 = 0.1 individuals per week
5. The two activities of animals, which get cues from diurnal and seasonal variations in light intensity, are
  - i. Timings of their foraging
  - ii. Migratory activities, Reproduction
6. The possible blood groups of children - A, B, AB, and O.
7. Two contrasting seed traits studied by Mendel are:-
  - i. Seed shape- Round and wrinkled Seed color- Yellow and green
8. Monascus purpureus (Yeast)
9. By Disulphide bonds.
10. Two benefits of LAB are given below
  - i. They improve the nutrient quality of curd by increasing the vitamin-B12 content
  - ii. LAB also checks the growth of disease causing microbes in the stomach.
11. (a) Both assertion and reason are correct.

**Explanation:** In Snapdragon flower, a cross between true breeding white and red coloured flower produces a pink coloured flower in F1 Generation. This happens due to incomplete dominance of alleles over the other.

**OR**

- (a) Assertion and reason both are correct

**Explanation:** In diploid cells, both chromosomes and genes occur in pairs. Two alleles of gene pair are located on homologous sites on homologous chromosomes.

12. (a) Both Assertion and Reason are true and the Reason is the correct explanation of the Assertion

Explanation: Skin and respiratory allergy problems arise in hilly areas due to allergen present in these areas. Allergen induces inflammatory reactions in the body.

13. (a) Both assertion and reason are correct

Explanation: An operon is a cluster of coordinately regulated genes. It includes structural genes (generally encoding enzymes), regulatory genes (encoding, e.g. activators or repressors, and regulatory sites (such as promoters and operators).

The type of control is defined by the response of the operon when no regulatory protein is present.

The inducer—repressor control of the lac operon is an example of negative control, in which expression is normally blocked.

In contrast, the CAP-cAMP system is an example of positive control, because the expression of the lac operon requires the presence of an activating signal.

14. (c) Assertion is the correct statement but reason is the wrong statement.

Explanation: Community and ecosystem diversity are of three types- alpha, beta, and gamma. Alpha diversity is the species diversity in a given community or habitat, alpha diversity is dependent upon species richness and evenness or equitability. Beta diversity is biodiversity, which appears in a range of communities due to the replacement of species with the change in community or habitat due to the presence of different micro- habitats, niches and difference in environment conditions. Gamma diversity is diversity present in ranges of communities as represented by the diversity of habitats or ecosystems over a total landscape or geographical area. Biodiversity is not uniform on the Earth. It varies with the change in latitude or altitude. Biodiversity increase, when we move from high to low latitude (i.e., from the poles to the equator)

15. i (c) Other organisms

ii. (d) all of these

iii. (a) revolution around the sun and tilted axis

iv. (a) 18 — 25°C and 150 — 400 cm

v. (b) Both Assertion and Reason are true but Reason is not the correct explanation of the Assertion

16. i. Monocarpellary

ii Stamen

iii integuments

iv. Mango

v. Only (I)

### **SECTION B**

17. The advent of the birth control pill makes it unnecessary to use other means of contraception, particularly the condom. Thus STDs are more readily transmitted during sexual activity.

18. Autosomal dominant.

The defective trait is present in both male and female progeny and the unaffected child did not pass the trait.

19. The strategy is based on the process of RNA interference.

It involves blocking of a specific mRNA due to complementary dsRNA molecule that binds to and prevents translation of the mRNA. It is called silencing of mRNA.

20. dsRNA gains entry into the eukaryotic cell either through

- i. infection by virus having an RNA genome.
- ii. mobile genetic elements (Transposons) that replicate via an RNA intermediate.

**OR**

Yeasts are the simplest single-celled eukaryotic organisms and like bacteria, they reproduce asexually by budding or fission, genetically well-characterized, easy to grow and manipulate. They can be grown readily in both small culture vessels and large scale bioreactor..

21. Retroviruses carry reverse transcriptase. This enzyme catalyses the formation of DNA from RNA which integrates with DNA of the host cell.

22. (1) Restriction endonucleases
- (2) Agarose gel
- (3) DNA - ligase
- (4) Plasmid
- (5) Hind II
- (6) Elution

**OR**

Selectable markers- They help in identifying and eliminating non-transformants and selectively permitting the growth of transformants. Normally, the genes encoding for antibiotic resistance to antibiotics such as ampicillin, tetracycline, kanamycin or chloramphenicol, etc., are considered as useful selectable markers for E. coli.

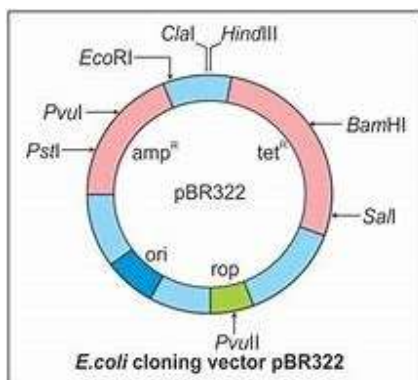


figure:. E. coli cloning vector pBR322 showing antibiotic resistance genes (ampR and tetR)

23. (i) More Solar radiation
- (ii) Less Seasonal Variation

24. (a) Symbiosis / mutualism  
(b) Commensalism  
(c) Parasitism

25. Considering that an overwhelmingly large proportion of the species waiting to be discovered are in the tropics. Biologists take a statistical comparison of the temperate-tropical species richness of an exhaustively studied group of insects and extrapolate this ratio to other groups of animals and plants to come up with a gross estimate of the total number of species on earth.

### **Section C**

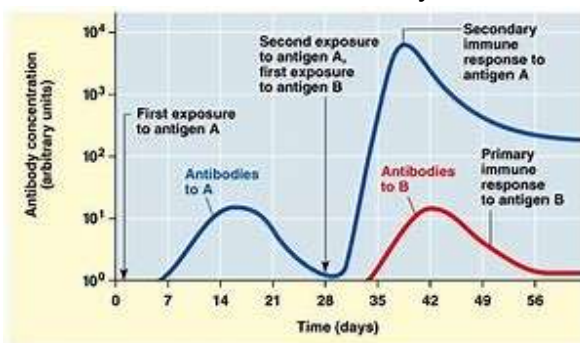
26. Mutations are new sudden, heritable, discontinuous variations which appear in the organisms due to a permanent change in their genotype. Point mutations are a type of gene mutations that involve the substitution, deletion or insertion of a single nucleotide or nitrogen base of the cistron e.g., Sickle Cell anaemia, an Autosomal hereditary disorder is caused by the formation of abnormal haemoglobin called HbS . HbS differs from front normal haemoglobin HbA in only one amino acid-6th amino acid of beta - chain of Glutamic acid is replaced by Valine. Thus disorder is due to the change of one nitrogen base in the cistron.

27. VNTR (Variable Number Tandem Repeat) is a location in the genome where a short nucleoside is organized as a tandem repeat. Analysis of VNTR is used for many purposes; including DNA fingerprinting. But bacteriophage does not have too many DNAs rather only a few strands of DNA are available in bacteriophage. This does not leave scope for repeating sequences in DNA. Hence VNTR cannot be used in DNA finger-printing of a bacteriophage.

28. **There are two immune responses:**

i The primary immune response occurs when an antigen comes in contact with the immune system for the first time. During this time the immune system has to learn to recognize the antigen and how to make an antibody against it and eventually produce memory lymphocytes.

ii. The secondary immune response occurs when the second time (3rd, 4th, etc.) the person is exposed to the same antigen. At this point, immunological memory has been established and the immune system can start making antibodies immediately.



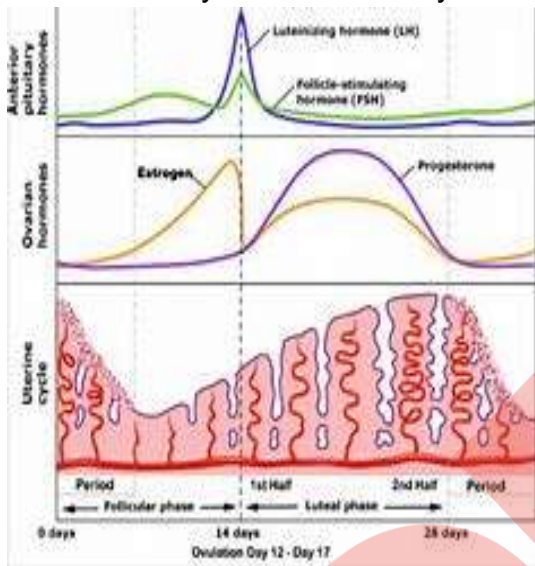
29. The process of transcription in eukaryotes can be explained as follow:

- (a) Splicing: The primary transcript of RNA undergoes splicing, the introns are removed and exons are joined together.
- (b) Capping: 7-methyl Guanosine triphosphate (cap) is added at 5' end.
- (c) Tailing: Adenylate residues ( 200 -300) are added at 3' end.

30. Uses of pollen bank and their applications

**OR**

- i. The parents were traditional but understood the need for such advertisements. They showed maturity and openness later.



Phases: To write details of the different phases describing the diagram

- a. Menstrual phase
- b. proliferative phase
- c. Secretory phase

**Section D**

31. The parts identified in the given TS of the ovary are as follows:

A-Graafian follicle

B-Antrum

C-Secondary oocyte D-Corpus Luteum

E--Primary follicle and Primary oocyte

In human females, primary oocytes are formed during the embryonic developmental stages in the foetal ovaries.

- a. Primary oocytes start dividing and enter prophase -I of meiosis to remain suspended at this stage.
- b. Each primary oocyte is surrounded by a layer of granulosa cells and becomes the primary follicle.
- c. The primary follicle when surrounded by more layers of granulosa cells, is called a secondary follicle.

- d. Secondary follicle transforms into a tertiary follicle, with the development of a fluid-filled cavity (antrum) around the primary oocyte.
- e. Granulosa cells become organised into an outer theca externa and an inner theca interna.
- f. Now, the primary oocyte completes meiosis-I and forms a larger haploid secondary oocyte and a tiny first polar body.

**OR**

- i) 'f'
- (ii) Estrogen & LH
- (iii) Lining of the uterus thickens in anticipation of fertilized zygote.
- (iv) 'c' is developing follicle and 'h' is corpus luteum which secretes progesterone.
- (v) Draw Fig 3.10 given in NCERT on page -51

32. i. Palindromic sequence for 5' - GAATTC - 3'  
3' - CTTAAG - 5'
- ii. Restriction endonuclease EcoRI recognizes the above palindromic sequence.
  - iii. Sticky ends on DNA are formed by the action of enzymes restriction endonucleases. These enzymes cut the strand of DNA a little away from the centre of the palindrome sequence between the same two bases on both the strands. This results in single- stranded stretches on both the complementary strands at their ends. These overhanging stretches are called sticky ends as they form hydrogen bonds with the complementary base pair sequences.

Rule of the Sticky ends -These sticky ends produced from hydrogen bonds with their complementary cut counterparts. This stickiness of the ends facilitates the action of the enzyme DNA ligase.

**OR**

- i. Cutting of the desired gene at a specific location is done by incubating the DNA with specific restriction endonuclease. Restriction enzymes recognize a particular palindromic nucleotide sequence and cut the DNA at that site.
- ii. Synthesis of multiple copies of the desired gene is carried out by Polymerase Chain Reaction (PCR)

Amplification of recombinant DNA gene is done using Polymerase Chain Reaction (PCR). It is carried out in the following steps:

- a. **Denaturation** -The double-stranded DNA is denatured by applying high temperature of 95°C for 15 seconds. Each separated strand acts as a template.
- b. **Annealing** - Two sets of primers are added, which anneal to the 2'end of each separated strand.
- c. **Extension** - DNA polymerase extends the primers by adding nucleotides complementary to the template provided in the reaction. Taq polymerase is used in the reaction, which can tolerate heat. All these steps are repeated many times to get several copies of the desired DNS

33. Primary treatment of sewage involves the physical removal of large and small particles from sewage through Filtration and sedimentation.

The steps involved in this process are:

i Floating debris is removed by sequential filtration by passing through wire mesh screens.

After this, the grit (soil and small pebbles) is removed by sedimentation in settling tanks. The sediment is called primary sludge and the supernatant forms the primary effluent.

ii The effluent is then taken for the secondary treatment.

The secondary treatment of sewage is also called biological treatment because, in this treatment, sewage is subjected to biodegradation. It means that it involves the participation of microorganisms. The process of secondary treatment involves the following steps:

(a) Primary effluent is passed into large aeration tanks with constant mechanical agitation and air supply. This allows vigorous growth of useful aerobic microbes into flocs (masses of bacteria and fungi filaments).

These microbes consume a major part of organic matter in the effluent while growing. This reduces the BOD of the effluent.

(b) When BOD of sewage gets reduced, it is passed into the settling tank. The bacterial flocs settle in the tank and the sediment is called activated sludge. A small amount of activated sludge is pumped BACK into the aeration tank to serve as inoculum.

iv. The remaining major part of the sludge is pumped into large tanks called anaerobic sludge digesters, where other kinds of bacteria, which grow anaerobically, digest the bacteria and the fungi in the sludge. During this process, bacteria produce a mixture of gases, such as methane, hydrogen sulphide and carbon dioxide, which form biogas. The effluent from secondary treatment is generally released into natural water bodies. It helps to reduce water pollution and water-borne diseases.

The gases from biogas are used as a source of energy because it is inflammable.

**OR**

Roles of 'Flocs' and 'activated sludge' in sewage treatment are as follows:

i. Flocs: These are masses of bacteria held together by slime and fungal filaments to form mesh-like structures. These are used during the secondary sewage treatment in the aeration tank to increase the rate of decomposition. The microbes digest a lot of organic matter, converting it into microbial biomass and releasing a lot of minerals. As a result, BOD of sewage reduces. As the BOD of waste is reduced to 1% of raw sewage, it is passed into the settling tank. In these tanks, flocs are allowed to undergo sedimentation.

Activated sludge: The sediment of settling tank is called activated sludge. A part of it is used as inoculum in aeration tanks. The remaining part is passed into a large tank called anaerobic sludge digester. In these tanks, anaerobic microbes are present that digest the organic mass as well as aerobic microbes of activated sludge. The remaining sludge is used as manure or compost.