DAV PUBLIC SCHOOLS, ODISHA **SET-1**
PRE-BOARD EXAMINATION
(2023-24)

- Please check that this question paper contains **12** printed pages.
- Check that this question paper contains **33** questions.
- Write down the serial number of the question in the left side of the margin before attempting it.
- 15 minutes time has been allotted to read this question paper. The question paper will be distributed 15 minutes prior to the commencement of the examination. The students will read the question paper only and will not write any answer on the answer script during this period.

CLASS –XII
SUB : BIOLOGY (044)

Time allowed: 3 Hours **Maximum Marks -70**

General Instructions:

(i) All questions are compulsory.
(ii) The question paper has five sections and 33 questions.
(iii) Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section–E has 3 questions of 5 marks each.
(iv) There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
(v) Wherever necessary, neat, and properly labelled diagrams should be drawn.

SECTION-A

1. Most of the angiospermic plants are diploid and adapts for cross pollination. If a cross is made between 12n female plant and 10n male plant, what would the ploidy of the PEC? **1**
(a) 12n (b) 11n (c) 22n (d)17n

2. A T.S of dithecous anther shows **1**
(a) Endothecium inner to middle layers
(b) Middle layer between endothecium and tapetum
(c) Tapetum below epidermis
(d) Tapetum just below endothecium

3. A piece of DNA has a length of 1.36mm. The no of base pair it has **1**
(a) 4.0×10^6 bp (b) 0.34×10^8bp (c) 1.36×10^6bp (d) 4.6×10^6bp

4. During sex determination in most of the insects it was observed that **1**
(a) All eggs bear X-chromosome with an extra autosome.
(b) All eggs bear an additional X-chromosome besides autosomes.
(c) Some sperms lack X-chromosomes but have normal autosomes.
(d) Some sperms have an X-chromosome with one extra autosome.

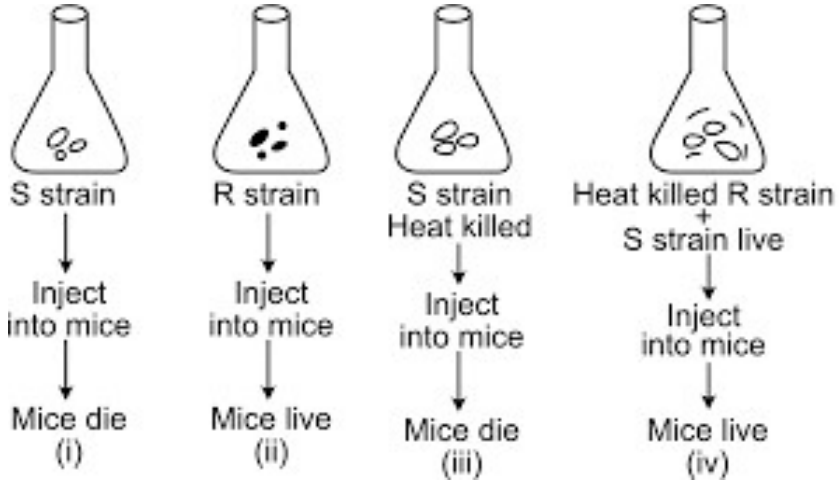
5. In a population of 1000 individual, 360 belong to genotype AA, 480 to Aa and remaining 160 to aa, based on this data, the frequency of allele A in the population is. **1**

(a) 0.6 (b) 0.5 (c) 0.4 (d) 0.7

6. In 1938, a lobe fin caught in South Africa happened to be Coelacalnth which are thought to be extinct . These animals evolved into **1**

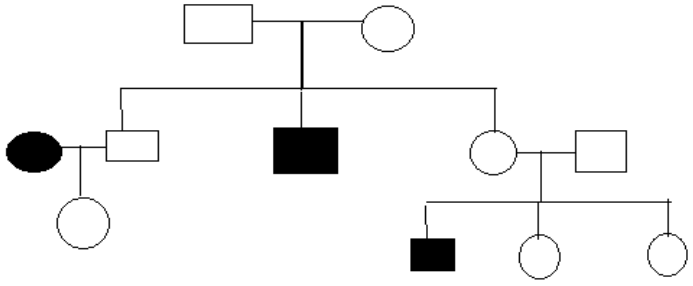
(a) Reptile (b) Birds (c) Amphibians (d) Mammals

7. Study the given diagrammatic representation of Griffth's experiment to demonstrate the transformation in bacteria. Select the option that incorrectly represents the experiment **1**



(a) (i) and (iii) (b) (ii) and (iii) (c) (iii) and (iv) (d) (ii) and (iv)

8. The genotype of the third child of the first couple could be **1**

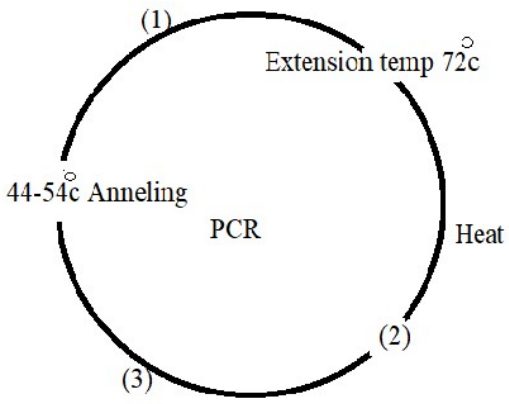


(a) X^hX (b) $X^C X$ (c) Aa (d) aa

9. The competitive inhibitor of the substrate for the enzyme synthesizing cholesterol is **1**

(a) Cyclosporin A (b) Statin (c) Streptokinase (d) Penicillin

10. Identify 1,2 and 3 in the following diagram. **1**

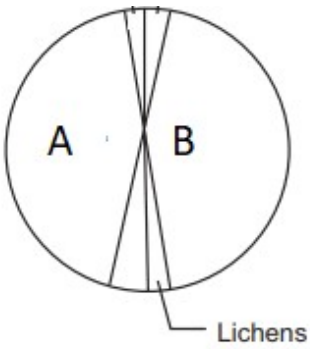


(a) (1) Taq polymerase (2) Denaturation at 94° C (3) Primer
(b) (1) Denaturation at 94° (2) Taq polymerase (3) Primer
(c) (1) Primer (2) Denaturation at 94° C (3) Primer
(d) (1) Taq polymerase (2) Extension (3) Ligation

11. Hyderabad's Footwear Design and Development Institute (FDDI), which was founded less than eight years ago, has been successful in obtaining six patents for goods created by its students. Their USPs (Unique Selling Points) are environmental friendly and helpful to those with disabilities. Based on the given information, choose the correct statement: **1**

(a) In 1995, an American company got rights on Basmati rice.
(b) It is not necessary for patent to be new and useful
(c) A patent is a set of exclusive right given for any invention which is new, non-obvious and useful.
(d) Nature's Tulsi products are examples of patent.

12. **1**



Identify the labelled areas A and B in the pie chart given above representing the biodiversity of plants showing their proportionate number of species of major taxa.

(a) A- Bryophytes, B- Gymnosperms
(b) A-Mosses, B-Ferns
(c) A-Fungi, B-Angiospersms
(d) A-Fungi, B-Gymnosperms

Questions No 13 to 16 consist of two statements – Assertion(A) and Reason(R). Answer these questions by selecting the appropriate options given below.

(a) Both assertion and reason are true and the reason is the correct explanation of the assertion.

(b) Both assertion and reason are true but the reason is not the correct explanation of the assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false and reason is true

13. **Assertion:** Exine of a pollen grain is made up of sporopollenin. **1**
Reason: Sporopollenin are absent in the region of germ pores.

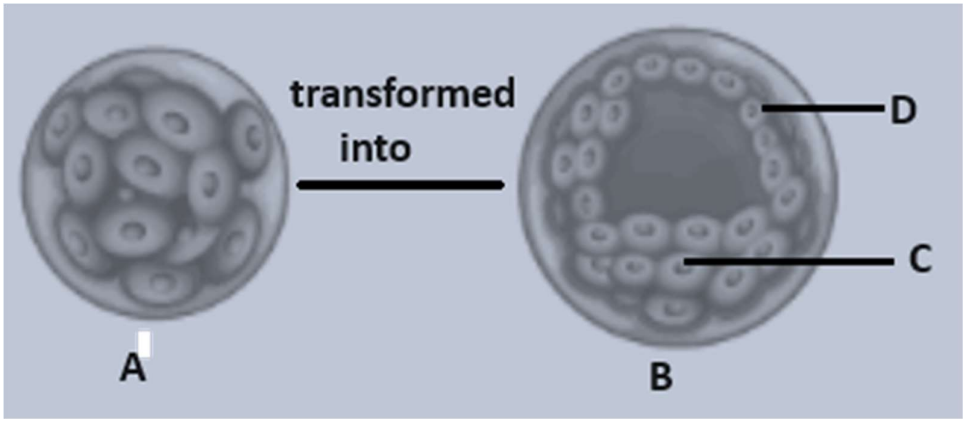
14. **Assertion**: The split gene arrangements probably represents the ancient features of the genome. **1**
Reason: The process of splicing represents the dominance of the RNA world.

15. **Assertion**: Repeated use of drugs, the tolerance level of the receptors presents in our body increases. **1**
Reason: Receptors respond to both higher and lower doses of drugs or alcohol leading to addiction.

16. **Assertion:** Hosts need to be made competent in order to receive the foreign DNA. **1**
Reason: DNA is a hydrophilic molecule, it cannot pass through cell membrane.

SECTION-B

17. Study the given diagram **2**



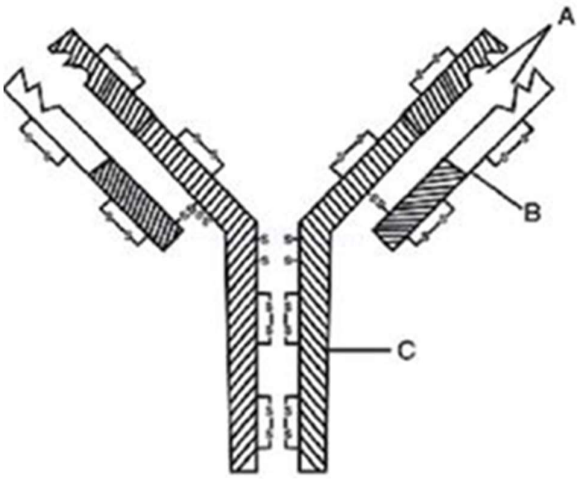
A is an embryonic stage that gets transformed into B, which in turn gets implanted in the endometrium in human females.

(a) Identify A and B.

(b) State the fate of C and D during embryonic development in humans.

18. Draw the 3D-structure of t-RNA for initiation codon. Show the codon-anticodon attachment with proper polarity along with the aminoacid attached at the proper site. **2**

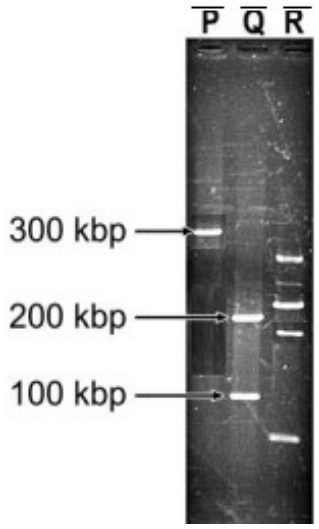
19. **2**



(a) Label the parts A, B and C.

(b) Name the cells (s) in our body that produce these chemicals.

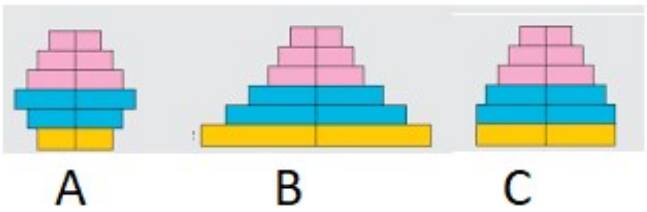
20. Nidhi performed gel electrophoresis after treating one vector with restriction enzymes. She loaded mixture in well P, Q and R. Given below is an image of the results obtained **2**



(a) State the conclusion that can be drawn about the samples loaded in P and Q respectively.

(b) Different number of fragments are obtained from sample Q and R. Give reasons.

21. **2**



Study the above age pyramids of human population and answer the following questions.

(a) Identify pyramids A and C.

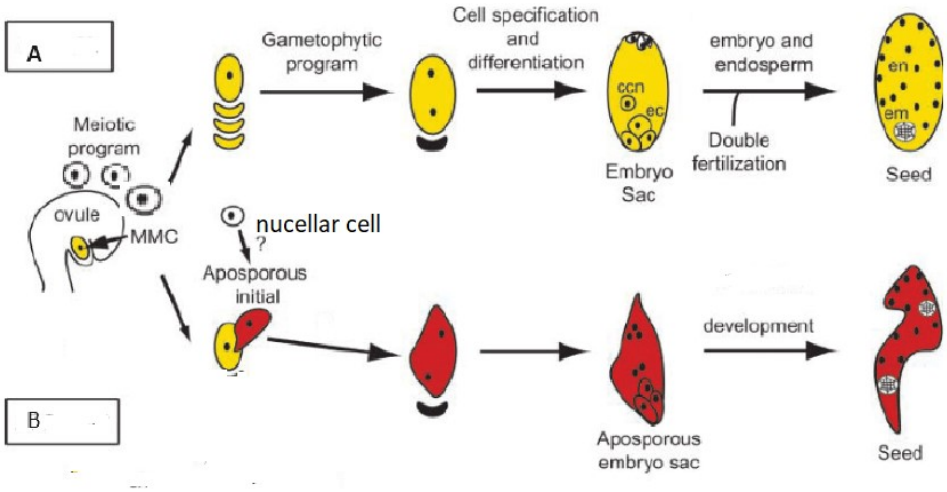
(b) Write the basis on which these pyramids are plotted.

OR

Explain 'standing crop' in an ecosystem. Draw a pyramid of biomass in a sea where a small standing crop of phytoplankton supports a large standing crop of zooplanktons which in turn supports small fishes and large fishes.

SECTION-C

22. **3**

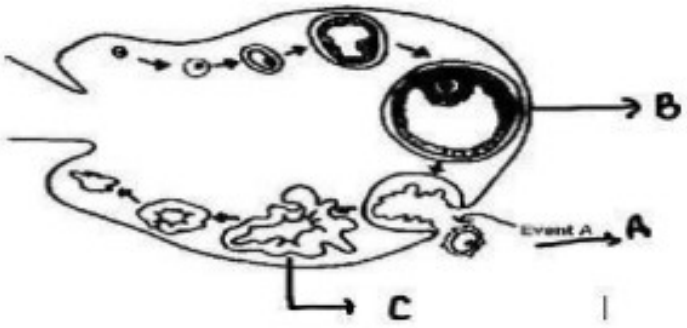


(a) Study the above figure and identify A and B.

(b) As a senior biology student, which type of seeds (A or B) you will recommend to the farmers for better yield and economic benefits. Give reasons in support your answer.

(c) Differentiate between the ploidy levels of seeds produced in A and B.

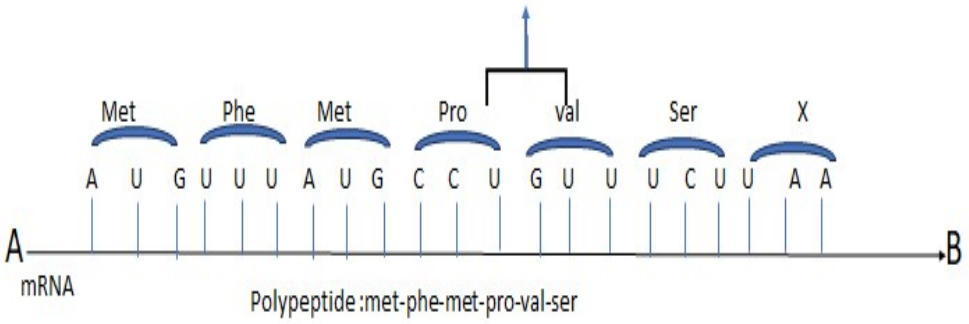
23. The figure below shows the sequence of changes within the ovary that occur during the menstrual cycle. **3**



(a) Name the process A. During which stage of menstrual cycle this event takes place.

(b) Identify B and C and name the hormones secreted by them respectively.

24. A hypothetical mRNA is shown below. Read the sequence of nucleotides in it and the sequence of amino acids in the polypeptide translated by it. **3**



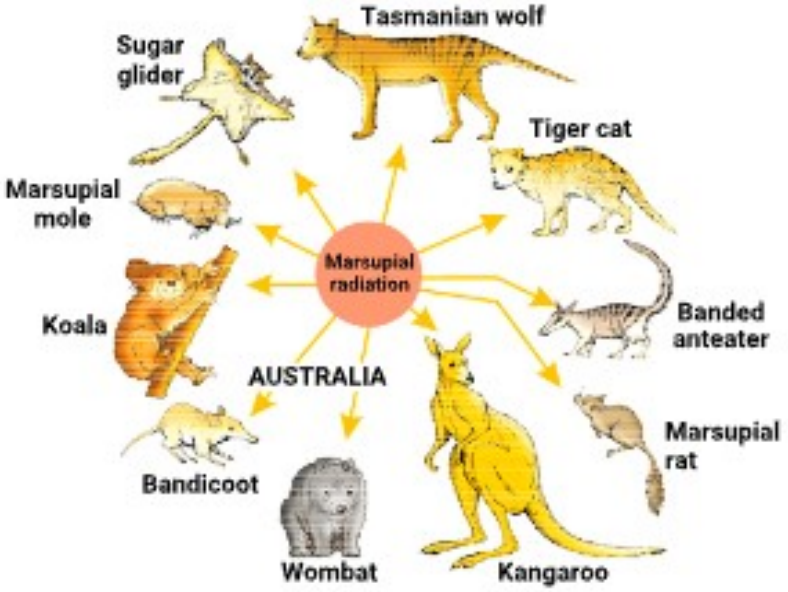
Answer the following questions based on the above mRNA.

(a) Write the sequence of nucleotides in the template strand of DNA, along with its polarity, from which this mRNA has been transcribed.

(b) Mention the significance of the last codon X in the mRNA shown? Name two other codons of the same category.

(c) If the last nucleotide of first codon changes to 'U', mention the number of amino-acids that can be added in the translation process.

25. 3



Observe the diagram given above and answer the questions

(a) Mention the specific geographical region where these organisms are found.

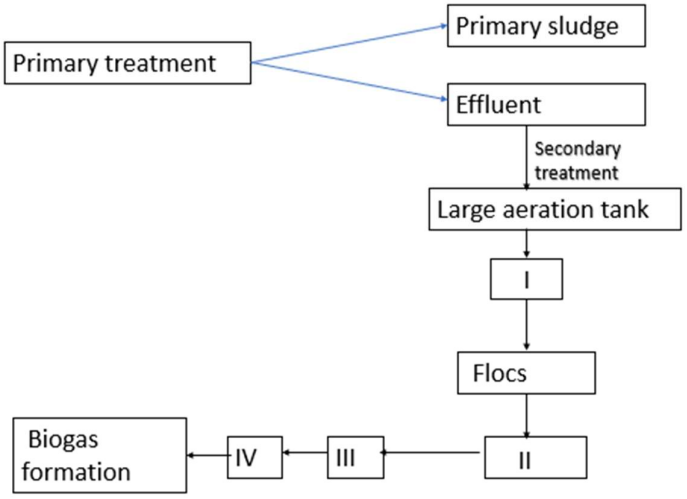
(b) Name and define the phenomenon that has resulted the evolution of such diverse species in the given region.

(c) Name an equivalent placental mammal for each of the following marsupial mammal , which share the same habitat.

i) Numbat

ii) Flying phalanger

26. **3**



(a) Identify I, II, III and IV.

(b) Why sewage water treated until the BOD is reduced? Give a reason.

27. Ecologists and evolutionary biologists have proposed various hypotheses regarding the greater biological diversity in tropics. Explain with reasons. **3**

28. Scientists have succeeded in recovering healthy sugarcane plants from a diseased one: **3**

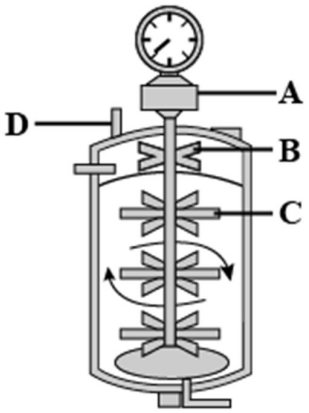
(a) Name the part of the plant used as explant by the scientists. State the basis of selection of explant in the above case. Give an example of another plant variety where this method was successful.

(b) Name the technology used and state the characteristics of such plants produced through it.

(c) Mention the property of plant cells that has helped them to grow into a new plant in laboratory conditions.

OR

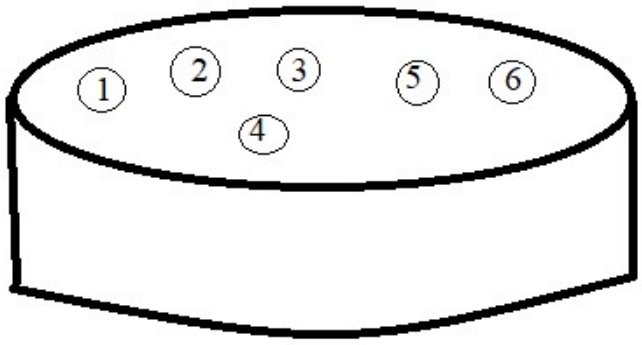
(d) Identify A, B, C and D in the given diagram.



State the purpose for which this equipment is used in rDNA technology.

SECTION-D

29. In an experiment the cloning vector used is pBR322 and the RE is *Pvu*I and the host is *E.coli*. The master plate prepared from the experiment is having the given bacterial colonies 1,2,3,4,5and 6. In this plate 1&3 colonies do not grow in either of the antibiotic containing nutrient media. 2,4,5 and 6 grow in tetracycline medium whereas only 5,6 grow in ampicillin containing medium. **4**



(a) Identify the colonies which are transformant-recombinants and transformant-non recombinants respectively.

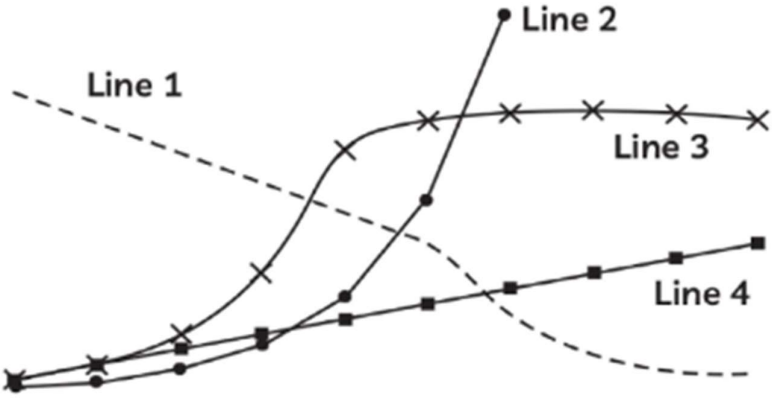
(b) Mention the importance of selectable markers in a cloning vector? Name any two such selectable markers.

(c) Ori has a dual role in a cloning vector. Mention them.

OR

If rop sequence from the cloning vector pBR322 is removed, how will it affect the expression of recombinant DNA?

30. The population growth curves for a particular population at different parameters are depicted in the graph below. **4**



(a) Which kind of curve/line best illustrates a population in a resource-constrained setting? Explain the curve.

(b) Which line represents a population that reaches a carrying capacity? Mention the shape of the curve.

(c) Identify the curve that represents population growth when resources are unlimited. Name the type of growth model exhibited by it.

(d) Which one of the above population growth curve is more realistic? Give an explanation in support of your answer.

OR

Write the equation of curve-3.Give the r value for human population in India in 1981.

SECTION-E

31. One 5 year married couple is worried because of their infertility. They decided to consult the gynaecologist. The doctor advised for the pathological tests. The result shows that the infertility is due to the male partner having malfunctioning sertoli cells. **5**

(a) Give the location of Sertoli cells and state their importance.

(b) Name the hormone that regulate the action of the Sertoli cells and Leydig cells respectively.

(c) Draw the cross-section of seminiferous tubules and label spermatogonia, primary spermatocyte, secondary spermatocyte, spermatid, and spermatozoa in it.

OR

The foetus shown above was diagnosed with gross genetic abnormalities. Looking into the conditions the consultant physicians advised for certain appropriate measures.

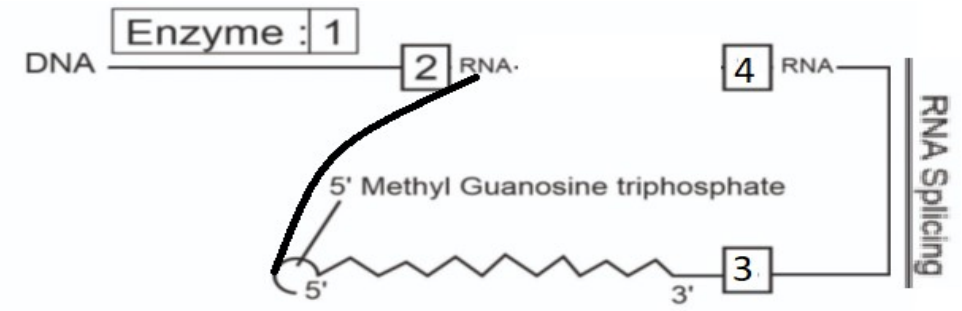
(a) Name and state the technique that can be used in detection of such abnormality.

(b) Name the legalized method that can be recommended in this case. Mention the year in which year such act was legalized in India.

(c) Mention two other such cases in which this method can be applicable.

(d) The method is allowed only under strict medical conditions. Give reasons.

32. (a) Given below is a sequence of steps that helps in the formation of RNA in a eukaryotic cell. Fill up the blanks (1, 2, 3, 4) left in the sequence. **5**



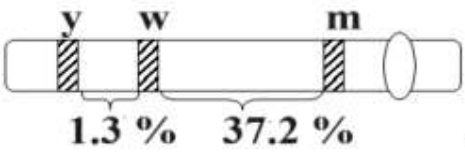
(b) Both the processes of transcription and translation are coupled in bacteria but not in eukaryotes. Justify.

(c) Name the enzymes involved in the transcription of 28s rRNA and 5s rRNA respectively.

OR

(a) A couple who has blood groups A and B have four children. Each child has a different blood group. Explain with the help of crosses to show how this is possible.

(b)



y - yellow body
w - white eye
m - miniature wing
in *Drosophila*

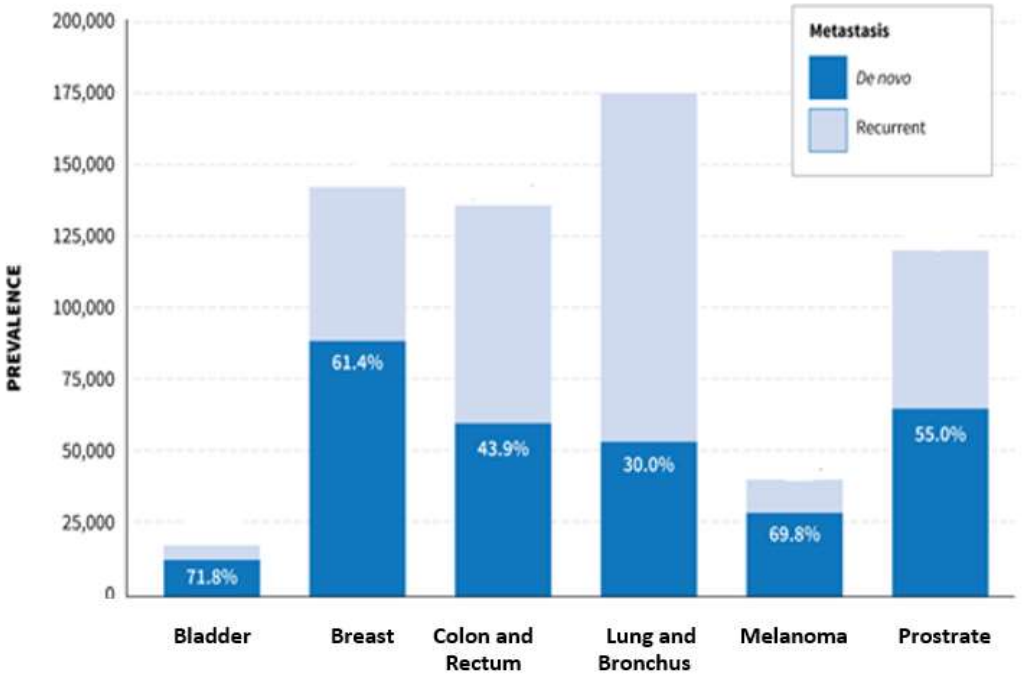
Above figure indicates the percentage of recombination between 2 pairs of genes – y and w; w and m. On the basis of this data answer the following questions.

(i) Which two of these genes are tightly linked? Justify your answer.

(ii) Which scientist used such data of the frequency of recombination between gene pairs on the same chromosome to prepare genetic maps and how?

(iii) How are genetic maps useful?

33. **5**



Estimated numbers of individuals living with metastatic cancer in the U.S on January 1, 2018, by cancer type, and percentage by cancer type who were diagnosed with metastasis de novo versus with early-stage disease that progressed to metastatic disease. Numbers above each bar represent total estimated metastatic prevalence for each caner type.

(a) With reference to the above graph, which type of recurrent cancer is maximum. Mention it's prevalence number.

(b) Name the techniques that can be used for detection of cancer of internal organs (Any two).

(c) Name and explain the most feared property of cancer cells.

(d) Name the specific genes present in human beings which when activated can lead to oncogenic transformation.

(e) The cancer patients are often given α – interferon as part of the treatment. Why?

OR

Antibiotics are the chemical substances, which are produced by some microbes and kill or retard the growth of other (disease-causing) microbes. They are regarded as one of the most significant discoveries of the twentieth century. The word 'antibiotic' means 'against life' in the context of disease-causing microbes and 'pro-life' with regards to human beings.

(a) Name the first antibiotic discovered and its source organism.

(b) Name the scientist who discovered the first antibiotic and the experimental organism on which he was worked with.

(c) Name the two other scientists who along with the discoverer of first antibiotic shared Nobel prize in Physiology and Medicine (1945).

(d) Name any four deadly diseases that can be treated by the use of antibiotics.

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