

QB365

Important Questions - Biotechnology and its Applications

12th Standard CBSE

Biology

Reg.No. :

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Time : 01:00:00 Hrs

Total Marks : 50

**Section - A**

- 1) Cultivation of Bt cotton has been much in the news. The prefix Bt means 1
  - (a) "Barium treated" cotton seeds
  - (b) "Bigger thread" variety of cotton with better tensile strength
  - (c) Produced by "biotechnology" using restriction enzymes and ligases
  - (d) Carrying an endotoxin gene from Bacillus thuringiensis
- 2) The first antibiotic was discovered by..... 1
  - (a) Louis Pasteur
  - (b) R. Koch
  - (c) W. Fleming
  - (d) A. Fleming
- 3) Terminators gene 1
  - (a) Help in terminating flowering
  - (b) Help in terminating seed germination
  - (c) used in hybridisation
  - (d) None of these
- 4) Golden rice is a transgenic crop of the future with the following improved trait: 1
  - (a) Insect resistance
  - (b) High lysine (essential amino acid) content
  - (c) High protein content
  - (d) high vitamin-A content
- 5) Bacillus thuringiensis (Bt) strains have been used for designing novel 1
  - (a) Biofertilizers
  - (b) Bio-metallurgical techniques
  - (c) Bio-mineralization processes
  - (d) Bio-insecticidal plants
- 6) Which bacteria is used as biopesticide first on the commercial scale in the world? 1
  - (a) Bacillus thuringiensis
  - (b) E.coli
  - (c) Pseudomonas aeruginosa
  - (d) Agrobacterium tumefaciens
- 7) Blindness is prevented by use of which crop in poor countries? 1
  - (a) Golden rice
  - (b) Wheat
  - (c) Gram
  - (d) Pea
- 8) Genetically engineered bacteria are being employed for production of 1
  - (a) Thyroxine
  - (b) Human insulin
  - (c) Cortisol
  - (d) Epinephrine
- 9) Which of the following is commonly used in transfer of foreign DNA into crop plants? 1
  - (a) Meloidogyne incognita
  - (b) Agrobacterium tumefaciens
  - (c) Penicillium expansum
  - (d) Trichoderma harzianum
- 10) The first clinical gene therapy was done for the treatment of: 1
  - (a) AIDS
  - (b) Cancer
  - (c) Cystic fibrosis
  - (d) SCID (Severe Combined Immuno Deficiency resulting from deficiency of ADA)

**Section - B**

- 11) How is 'Rosie' considered different from a normal cow? Explain. 2
- 12) How is recombinant DNA technology helping in detecting the presence of mutant genes in cancer patients? 2
- 13) What is biopiracy? why should nations develop laws against biopiracy? 2
- 14) Mention the steps undertaken during gene therapy to treat an ADA - deficient patient. 2
- 15) Gene therapy is an attempt to correct a genetic defect by providing a normal gene into the individual. By this, the normal function can be restored. An alternate method would be to provide the gene product (protein/enzyme) known as enzyme replacement therapy. It would also restore the function. Which in your opinion is a better option? Give reason for your answer. 2
- 16) What is gene library? 2
- 17) Name three different marker genes used in gene transfer in animal cells. 2
- 18) What is the source of complementary strand in mRNA silencing? 2
- 19) How is a mature, functional insulin hormone different from its pro-hormone form? 2
- 20) Which animals are being used for testing the safety of vaccines? Name the vaccine for which trials are going on. 2

### Section - C

- 21) (i) What are the three options that can be thought of, to increase food production? (ii) Mention the reasons for the success of green revolution in increasing food production. (iii) Why do we still search for other alternatives to increase food production? 5
- 22) Umesh's grandfather went to village to meet his old friend, after a long time. He found that his friend who once was a big landlord became very poor. Grandfather asked the reason of his poverty in spite of so much land he possessed. He told that his land is suitable for growing cotton and every his crop is devastated by insect attacks and he has been suffering heavy losses. Grandfather consoled him and advised him to grow BT cotton in his fields. 5
- Read the above passage and answer the following questions:
- (i) What is BT Cotton?
- (ii) How has it been developed?
- (iii) How did grandfather help his friend in solving his financial problems?
- 23) Sakshi's father announced that the children are going to spend this weekend with their grandparents. During the journey Sakshi saw some farmers who were spraying agrochemicals in their field. She requested her father to stop them. Her father praised her and contacted the farmers. He explained the side effects of such agrochemicals. He also suggested them to use biopesticides and bio fertilisers instead of such chemicals. The farmers gave up spraying agrochemicals. 5
- (i) What did Sakshi's father explain to the farmers?
- (ii) What are agrochemicals?
- (iii) Why are biofertilisers or biopesticides preferred to chemical fertilisers or pesticides?
- (iv) What values did Sakshi promote?

24) Prashant's mother is suffering from a disorder for which doctor suggests her to take insulin injections. But his mother declines as she presumes injection are prepared by slaughtering of animals. Doctor smiled and explained him about the genetically engineered human insulin produced these days. He also convinced her to take injections.

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(i) Name the bacterium that is used to produce human insulin.

(ii) Name the company that first produced human insulin.

(iii) Name the disease that is treated by using human insulin.

(iv) What values are shown by the doctor?

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### Section - A

- 1) (d) Carrying an endotoxin gene from *Bacillus thuringiensis* 1
- 2) (d) A.Fleming 1
- 3) (b) Help in terminating seed germination 1
- 4) (d) high vitamin-A content 1
- 5) (d) Bio-insecticidal plants 1
- 6) (a) *Bacillus thuringiensis* 1
- 7) (a) Golden rice 1
- 8) (b) Human insulin 1
- 9) (b) *Agrobacterium tumefaciens* 1
- 10) (d) SCID (Serve Combined Immuno Deficiency resulting from deficiency of ADA) 1

### Section - B

- 11) 2
  - Rosie is the first transgenic cow.
  - The milk contained human protein,  $\alpha$ -lactalbumin (2.4 g per litre) which is nutritionally important for human babies.
- 12) 2
  - A single-stranded DNA or RNA is tagged with a radioactive molecule and used as a probe.
  - It is allowed to hybridise with its complementary DNA in a clone of cells, followed by detection using autoradiography.
  - The clone having the mutant gene will not appear on the photographic film, because the probe will not be complementary with the mutated gene.

- 13) 2  
Biopiracy refers to the unauthorised use of bioresources and traditional knowledge related to bioresources for commercial benefit by certain organisations, without proper consent from the concerned nation or authority.  
Nations must develop laws to prevent unauthorised exploitation of their bioresources and traditional knowledge.
- 14) 2  
- The lymphocytes from the blood of the patient are grown in culture in vitro.  
- A functional ADA cDNA is introduced into lymphocytes using a retroviral vector.  
- The lymphocytes are introduced back into the blood of the patient. - But a patient requires periodic infusion of such genetically-engineered lymphocytes, as lymphocytes have a life span.  
- If the functional gene (producing ADA) isolated from marrow cells is introduced into the cells of early embryonic stages, it could be a permanent cure.
- 15) Gene therapy would be a better option because it has the potential to completely cure the patient. 2
- 16) 2  
Gene Library. Several clones of cells each containing one of a few foreign genes are finally obtained, representing almost all the genes of an organism, it is termed gene library of that organism. From that gene library it is possible to identify a clone containing gene of interest. In order to obtain gene library of an organism, its genome is first cut into smaller DNA fragments containing one or a few genes and such fragments can be cloned in cell where such a cell multiplies to form a group of cells, all cells have same foreign DNA and are termed clone
- 17) CAD protein gene, gene encoding for luciferase and gene encoding for thymidine kinase 2
- 18) (i) Viruses having RNA genomes. 2  
(ii) Mobiles genetic elements (transposons).
- 19) 2  
Pro-hormon bears extra peptide known as C-peptide. During maturity C-peptide is removed and pro-insulin forms insulin.
- 20) Transgenic mice are used for testing the safety of vaccines. 2  
The trials are going on for polio vaccine.

### Section - C

21)

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(I) Options to increase food supply:

- Agro-chemical based agriculture, using chemical fertilizers and pesticides.
- Organic agriculture, using biofertilizers, biopesticides, vermi composting, etc.
- Genetically-engineered (GM) crops based agriculture.

(il) The success of Green Revolution was due to

- Use of improved/hybrid crop varieties
- Better management practices.
- Use of agrochemicals (pesticides and fertilisers).

(iii) We still search for other methods for the following reasons:

- The agrochemicals cause pollution of soil and water and reduce the yield in the long run; they are too expensive for the farmers.
- Further increase in the yield of the existing varieties by conventional breeding is not possible.

22)

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(i) BT cotton is genetically modified cotton.

(ii) It has been developed by introducing BT toxin gene to the cotton plant from a bacterium which is resistant to bollworms.

(iii) Grandfather was concerned about the well being of his friend and advised him to grow genetically modified, disease resistant variety of crop.

23)

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(i) Sakshi's father explained the harmful effects of agrochemicals on the health, environment and the fields.

(ii) Agrochemical is a term used to refer to the various chemical products used in agriculture such as fertilisers, pesticides and herbicides.

(iii) Biofertilisers or biopesticides are preferred because they are cost effective, environment friendly and provide better nourishment to plants.

(iv) Health awareness, ecofriendly nature careful and vigilant attitude.

24) (i) E. coli

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(ii) Eli Lilly (an American company)

(iii) Diabetes

(iv) The doctor is responsible, caring and honest towards his duty.