

**Q.1.** Select the correct statement wrt use of biotechnology in agricultural applications

- A. Bt cotton is a transgenic crop resistant to bollworm.
- B. cry protein is toxic to insects in its original form.
- C. cry genes are obtained from *Bacillus thuringiensis*.
- D. *cryIAc* controls cotton bollworm pests.
- E. Bt toxin is activated in alkaline gut of insects.

- (1) C and E only
- (2) A, C, D and E only
- (3) C, D and E only
- (4) D and E only

**Q.2.** Choose correct statement wrt bio-pesticides

- A. Bt crops reduce use of chemical insecticides.
- B. This helps maintain environmental balance.
- C. Bt toxin is non-specific and does harm non-target insects.
- D. Bt toxin kills all insects indiscriminately.
- E. Bio-pesticides can be developed through genetic engineering.

- (1) C and E only
- (2) A, B and D only
- (3) C, D and E only
- (4) D and E only

**Q.3.** Choose correct statement wrt RNA Interference (RNAi)

- A. RNAi silences expression of specific mRNA.
- B. It is mediated by double-stranded RNA.
- C. RNAi was first discovered in *Caenorhabditis elegans*.
- D. Used to protect tobacco plants from nematodes.
- E. RNAi enhances expression of the target gene.

- (1) C and E only
- (2) A, C, D and E only
- (3) A, B, C and E only
- (4) D and E only

**Q.4.** Read the following statements (A–E) and choose the correct statement only

- A. Biopiracy refers to the unauthorised use of biological resources and traditional knowledge by organisations or companies without proper permission or compensation.
- B. Industrialised nations are generally rich in biodiversity and traditional knowledge but poor in financial resources.
- C. Developing countries are often rich in biodiversity and traditional knowledge related to bio-resources.
- D. Traditional knowledge can help in developing modern applications and reduce cost and time in product commercialisation.
- E. India has amended its Patent Bill to address issues related to biopiracy and ensure fair compensation and benefit sharing.

**Options:**

- (1) A, C, D and E only
- (2) A, B and D only
- (3) A, B, C and E only
- (4) All statements are correct

**Q.5.** Choose correct statement with respect to genetically engineered Insulin

- A. Recombinant insulin (Humulin) is produced using *E. coli*.
- B. Human insulin gene was synthesized and expressed as a single chain.
- C. In reality, A and B chains were produced separately in bacteria.
- D. Disulfide bonds were formed to assemble functional insulin.
- E. Recombinant insulin is identical to natural human insulin.

- (1) A, C, D and E only
- (2) A, B and D only
- (3) C, D and E only
- (4) D and E only

**Q.6.** Read the following statements (A–E) and choose the correct statements only :

- A.** To meet the rising food demand, three main strategies are considered: agro-chemical based agriculture, organic agriculture, and genetically engineered crop-based agriculture.
- B.** The Green Revolution succeeded in tripling food supply but still could not fully meet the requirements of the growing population.
- C.** The increased yields during the Green Revolution were mainly due to genetic modification of crops using recombinant DNA techniques.
- D.** Agro-chemicals like fertilizers and pesticides played a major role in yield improvement during the Green Revolution.
- E.** For many farmers in developing countries, agro-chemicals are often too costly, and further yield improvement through conventional breeding has reached a limit.

- (1) A, B and D only
- (2) D and E only
- (3) B, C and E only
- (4) A, B, D and E only

**Q.7.** Read the following statements (A–E) and choose the correct statements only

- A.** Tissue culture involves growing plant parts (explants) in sterile nutrient media to regenerate whole plants.
- B.** The ability of a plant cell to generate a complete plant is known as totipotency.
- C.** Micropropagation enables mass production of genetically identical plants, also called somaclones.
- D.** Virus-free plants can be obtained through in vitro culture of apical or axillary meristems, since meristematic regions are usually free of viruses.
- E.** Fusion of protoplasts from different plant species to form hybrid plants is called micropropagation.

- (1) A, B and D only
- (2) C and D only
- (3) A, B, D and E only
- (4) A, B, C and D only

**Q.8.** Read the following statements (A–E) and choose the correct statement only

- A.** Manipulation of living organisms by humans requires ethical regulation and moral evaluation.
- B.** Genetic modification of organisms can have unpredictable ecological consequences.
- C.** In India, the Genetic Engineering Approval Committee (GEAC) decides the safety and validity of GM research and release.
- D.** Patent issues have arisen because companies claim ownership over biological materials traditionally used by local farmers and indigenous people.
- E.** The Indian Government has banned all forms of genetic modification in public service sectors.

**Options:**

- (1) A, B and C only
- (2) A, B, C and D only
- (3) B, D and E only
- (4) B and C only

**Q.9.** Read the following statements (A–E) and choose the correct one only

- A.** Recombinant DNA technology has revolutionised healthcare by enabling large-scale production of safe and effective therapeutic drugs.
- B.** Recombinant therapeutics are preferred over those from non-human sources because they reduce the risk of immune reactions.
- C.** At present, approximately 30 recombinant therapeutics have been approved globally for human use.
- D.** In India, all 30 recombinant therapeutics are currently available in the market.
- E.** The use of recombinant therapeutics ensures uniformity, safety, and minimal immunological complications in patients.

- (1) A, B and C only
- (2) A, B, C and E only
- (3) A, C, D and E only
- (4) C and D only

**Q.10.** Read the following statements (A–E) and choose the correct one only :

- A.** *Bacillus thuringiensis* produces insecticidal crystal proteins (Cry proteins) that are toxic to specific groups of insects.
- B.** The Bt toxin exists in the bacterium as an active toxin that helps protect the bacterial cells from other microbes.
- C.** In the insect gut, the inactive Bt protoxin is converted into an active toxin due to the alkaline pH.
- D.** The activated Bt toxin binds to the midgut epithelial cells of insects, creates pores, and causes cell lysis leading to death.
- E.** The gene *cryIAc* controls the corn borer pest, while *cryIAb* and *cryIIAb* control cotton bollworms.

(1) A, C and D only

(2) A, B and E only

(3) A, C, D and E only

(4) All statements are correct

**Q.11.** Read the following statements (A–E) and choose the incorrect statement :

- A.** Transgenic mice are being developed to test the safety of vaccines before they are used in humans.
- B.** Transgenic mice are currently being tested for the safety evaluation of the polio vaccine.
- C.** The use of transgenic mice for vaccine safety testing could reduce dependence on monkeys.
- D.** Chemical safety testing (toxicity testing) involves creating transgenic animals that are less sensitive to toxic substances than normal animals.
- E.** Transgenic animals used in toxicity testing help obtain quicker results about the harmful effects of chemicals and drugs.

(1) A, B and C only

(2) A, B, C and E only

(3) B, C, D and E only

(4) D only

**Q.12.** Read the following statements (A–E) and choose the correct statements regarding insulin therapy

- A.** In earlier times, insulin for diabetic patients was extracted from the pancreas of slaughtered cattle and pigs.
- B.** Animal insulin sometimes caused allergic reactions in humans because it was a foreign protein.
- C.** In humans, insulin is initially synthesized as a pro-hormone that contains an additional C-peptide.
- D.** The mature functional insulin molecule contains the C-peptide along with A and B chains.
- E.** The American company *Eli Lilly* produced human insulin in *E. coli* using recombinant DNA technology by separately synthesizing A and B chains and then joining them via disulphide bonds.

(1) A, B and C only

(2) A, B, C and E only

(3) A, C, D and E only

(4) C and D only

**Q.13.** Read the following statements (A–E) and choose the correct statement only

- A.** Biotechnology deals with the large-scale production of biopharmaceuticals and biologicals using genetically modified organisms.
- B.** The applications of biotechnology include therapeutics, diagnostics, agriculture, food processing, and waste management.
- C.** Energy production and bioremediation are among the applications of biotechnology.
- D.** One major research area in biotechnology is improving natural catalysts, usually in the form of microorganisms or enzymes.
- E.** Downstream processing in biotechnology refers to modifying genes in plants and animals.

(1) A, B and D only

(2) C and D only

(3) A, B, D and E only

(4) A, B, C and D only

**Q.14.** Read the following statements (A–E) and choose the correct statement only

- A.** Transgenic animals can be used to produce valuable biological products such as human therapeutic proteins.
- B.** The gene coding for human  $\alpha$ -1-antitrypsin has been introduced into transgenic animals to treat emphysema.
- C.** The transgenic cow *Rosie* was produced in 1997 and secreted human protein-enriched milk containing  $\alpha$ -lactalbumin.
- D.** The milk produced by *Rosie* was less nutritious for human babies compared to normal cow milk.
- E.** Production of transgenic animals helps in reducing the cost of biological medicines.

- (1) A, B and C only
- (2) A, B, C and E only
- (3) B, D and E only
- (4) D only

**Q.15.** Read the following statements (A–E) and choose the correct statements only

- A.** Early diagnosis and understanding of disease pathophysiology are essential for effective treatment.
- B.** Conventional diagnostic methods like serum and urine analysis allow early detection of most diseases.
- C.** Recombinant DNA technology can help in early detection of genetic or infectious diseases.
- D.** PCR is used to amplify specific DNA sequences to detect pathogens or mutations at an early stage.
- E.** ELISA is a diagnostic test based on antigen–antibody interaction.

- (1) A, C, D and E only
- (2) A and B only
- (3) A, B and C only
- (4) C and D only

**Q.16.** Read the following statements (A–E) and choose the correct statement only

- A.** The first clinical gene therapy was performed in 1990 on a 4-year-old girl suffering from ADA deficiency.
- B.** ADA (adenosine deaminase) is essential for proper functioning of the immune system.
- C.** ADA deficiency can be permanently cured by enzyme replacement therapy alone.
- D.** In gene therapy for such patient, functional ADA cDNA is introduced into patient's lymphocytes using a retroviral vector.
- E.** Permanent cure can be achieved if the functional ADA gene is introduced at early embryonic stages.

- (1) A, B and D only
- (2) A, B, D and E only
- (3) B, C and D only
- (4) All statements are correct**

**Q.17.** Read the following statements (A–E) about RNAi method for pest resistance and choose the incorrect statements only

- A.** The nematode *Meloidogyne incognita* infects tobacco plant leaf mainly and reduces crop yield.
- B.** RNA interference (RNAi) is a natural defense mechanism in eukaryotes that silences specific mRNA molecules.
- C.** In RNAi, a complementary double-stranded DNA (dsDNA) prevents the translation of the target mRNA.
- D.** Transgenic plants expressing nematode-specific dsRNA become more susceptible to nematode attack.
- E.** Agrobacterium vectors were used to introduce nematode-specific genes into tobacco plants, leading to the formation of dsRNA and silencing of nematode genes.

- (1) A, B and C only
- (2) A, B, C and E only
- (3) A, C and D only
- (4) A and B only

**Q.18.** Read the following statements (A–E) and choose the correct statements only

- A.** Protoplasts are plant cells whose cell walls have been enzymatically removed, leaving only the plasma membrane.
- B.** Fusion of protoplasts from two different plant varieties results in the formation of hybrid protoplasts.
- C.** The process of fusing two protoplasts from different species or varieties is known as somatic hybridisation.
- D.** The hybrid plants produced by somatic hybridisation are called somaclones.
- E.** Fusion of tomato and potato protoplasts produced a hybrid plant called pomato, which was not commercially successful.

- (1) A, B, C and E only
- (2) A, B and C only
- (3) A, C, D and E only
- (4) C and D only

**Q.19.** Read the following statements (A–E) and choose the correct statements only

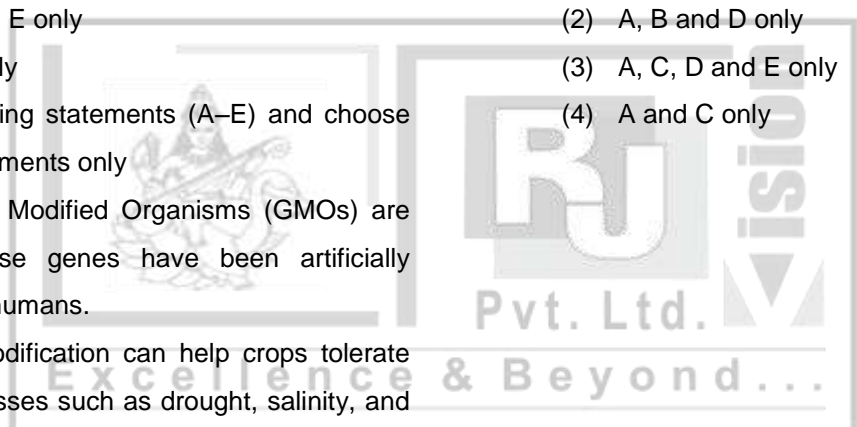
- A.** Genetically Modified Organisms (GMOs) are those whose genes have been artificially altered by humans.
- B.** Genetic modification can help crops tolerate abiotic stresses such as drought, salinity, and temperature extremes.
- C.** Pest-resistant genetically modified crops have helped reduce dependence on chemical pesticides.
- D.** Golden rice is an example of genetically modified rice enriched with Vitamin B<sub>12</sub>.
- E.** Genetic modification can enhance mineral uptake efficiency, thereby improving soil fertility management.

- (1) A, B and C only
- (2) A, B, C and E only
- (3) A, C, D and E only
- (4) B and C only

**Q.20.** Read the following statements (A–E) and choose the correct statement only

- A.** Transgenic animals are used to study how specific genes regulate normal physiology and body development.
- B.** Introduction of foreign genes can help researchers understand the biological role of factors like insulin-like growth factor.
- C.** Transgenic animals are often created to serve as models for human diseases such as cancer and Alzheimer's disease.
- D.** Transgenic models cannot be used to test new treatments for diseases because they differ genetically from humans.
- E.** Studying transgenic animals helps in understanding gene function and the genetic basis of disease development.

- (1) A, B, C and E only
- (2) A, B and D only
- (3) A, C, D and E only
- (4) A and C only



**ANWERS - KEY**

<b>Q</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
<b>Ans.</b>	<b>(2)</b>	<b>(2)</b>	<b>(3)</b>	<b>(1)</b>	<b>(1)</b>	<b>(4)</b>	<b>(4)</b>	<b>(2)</b>	<b>(2)</b>	<b>(1)</b>
<b>Q</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>
<b>Ans.</b>	<b>(4)</b>	<b>(2)</b>	<b>(4)</b>	<b>(2)</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(1)</b>	<b>(2)</b>	<b>(1)</b>

