Q1. What is the main application of Bt cotton?

A. Increased yield
B. Resistance to drought
C. Resistance to insect pests
D. Tolerance to herbicides

Answer: C
Explanation: Bt cotton contains a gene from Bacillus thuringiensis that produces a toxin against bollworm pests.

Q2. Which gene is introduced into a plant to make it resistant to herbicide glyphosate?

A. cryIAc
B. bar
C. EPSPS
D. nptII

Answer: C
Explanation: EPSPS (5-enolpyruvylshikimate-3-phosphate synthase) gene confers resistance to glyphosate herbicide.

Q3. Statement I: RNA interference silences specific mRNA.
Statement II: RNA interference involves antisense DNA binding to mRNA.

A. Only Statement I is true
B. Only Statement II is true
C. Both statements are true
D. Both statements are false

Answer: A
Explanation: RNAi involves small double-stranded RNAs, not DNA, that bind to mRNA and prevent translation.

Q4. Which of the following is used to produce insulin by recombinant DNA technology?

A. Yeast
B. Escherichia coli
C. Agrobacterium

D. Mycobacterium

Answer: B
Explanation: E. coli is commonly used for producing recombinant human insulin.

Q5. Match the following transgenic organisms with their purpose:

Organism Purpose

A. Rosie (cow) 1. Produces human alpha-lactalbumin
B. Bt brinjal 2. Insect resistance
C. Golden rice 3. Rich in provitamin A
D. Flavr Savr tomato 4. Delayed ripening

A. A–1, B–2, C–3, D–4
B. A–2, B–1, C–4, D–3
C. A–3, B–1, C–2, D–4
D. A–4, B–3, C–1, D–2

Answer: A
Explanation: Each transgenic organism was created for a specific improvement using biotechnology.

Q6. Golden rice is genetically modified to produce:

A. Vitamin C
B. Vitamin A
C. Vitamin D
D. Iron

Answer: B
Explanation: It is enriched with provitamin A (beta-carotene) to prevent blindness.

Q7. Assertion (A): Transgenic animals are used to study gene functions.
Reason (R): Genes can be introduced into animals to observe their effect.

A. Both A and R are true, and R is the correct explanation
B. Both A and R are true, but R is not the correct explanation

C. A is true, R is false
D. Both A and R are false

Answer: A
Explanation: Introducing genes into animals helps in studying expression, function, and disease models.

Q8. Which of the following is a technique used to silence a gene?

A. Recombinant DNA
B. RNA interference
C. Gene cloning
D. PCR

Answer: B
Explanation: RNA interference (RNAi) silences specific gene expression post-transcriptionally.

Q9. Which of the following is NOT a benefit of genetically modified (GM) crops?

A. Pest resistance
B. Reduced chemical pesticide use
C. Increased allergic reactions
D. Higher yield

Answer: C
Explanation: GM crops are usually tested to be safe; allergic reactions are not a benefit but a concern.

Q10. Statement I: Recombinant vaccines are more specific than traditional vaccines.
Statement II: Recombinant vaccines use weakened or dead pathogens.

A. Only Statement I is true
B. Only Statement II is true
C. Both statements are true
D. Both statements are false

Answer: A
Explanation: Recombinant vaccines use only antigenic parts of the pathogen, not whole pathogens.

Q11. The first transgenic cow, Rosie, produced:

A. Human insulin
B. Alpha-1 antitrypsin
C. Human alpha-lactalbumin-rich milk
D. Interferon

Answer: C
Explanation: Rosie was developed to produce milk rich in human alpha-lactalbumin to supplement infant nutrition.

Q12. Match the following:

Term Description

A. Biopiracy 1. Use of resources without permission
B. Biopatent 2. Legal right over biological material
C. Bioethics 3. Study of ethical issues in biology
D. Bioreactor 4. Vessel for large-scale culture

A. A–1, B–2, C–3, D–4
B. A–2, B–1, C–4, D–3
C. A–3, B–4, C–2, D–1
D. A–4, B–3, C–1, D–2

Answer: A
Explanation: Standard definitions and their correct associations.

Q13. Which of the following is a biotechnological application in the medical field?

A. Production of enzymes
B. Production of biofertilizers
C. Production of antibiotics
D. Production of genetically engineered insulin

Answer: D
Explanation: Insulin production using recombinant DNA is a major medical application.

Q14. Assertion (A): GM crops can reduce the use of synthetic pesticides.
Reason (R): They express insecticidal proteins like cry genes.

A. Both A and R are true, and R is the correct explanation
B. Both A and R are true, but R is not the correct explanation
C. A is true, R is false
D. Both A and R are false

Answer: A
Explanation: GM crops like Bt cotton produce insecticidal proteins, reducing the need for external pesticides.

Q15. Which genetically engineered organism is used to treat emphysema?

A. E. coli producing insulin
B. Cow producing alpha-lactalbumin
C. Transgenic sheep producing alpha-1 antitrypsin
D. Bacteria producing interferons

Answer: C
Explanation: Alpha-1 antitrypsin is used in the treatment of emphysema and is produced in transgenic sheep.

Q16. Which bacterium produces the cry gene used in transgenic crops?

A. Agrobacterium tumefaciens
B. Bacillus subtilis
C. Bacillus thuringiensis
D. Clostridium botulinum

Answer: C
Explanation: Bacillus thuringiensis produces the cry gene, which encodes an insecticidal protein.

Q17. Which of the following diseases is treated using recombinant alpha-1 antitrypsin?

A. Emphysema
B. Diabetes
C. Tuberculosis
D. Cancer

Answer: A
Explanation: Alpha-1 antitrypsin is used for treating inherited emphysema caused by its deficiency.

Q18. Which of the following is a bioethical issue in biotechnology?

A. Use of stem cells
B. Use of bioreactors
C. Use of PCR
D. Use of restriction enzymes

Answer: A
Explanation: Stem cell research raises ethical questions related to embryo manipulation and human life.

Q19. Match the following GM crops with their traits:

GM Crop Trait

A. Bt cotton 1. Insect resistance
B. Golden rice 2. Provitamin A
C. Flavr Savr 3. Delayed ripening
D. Super banana 4. High iron content

A. A–1, B–2, C–3, D–4
B. A–2, B–3, C–4, D–1
C. A–3, B–4, C–1, D–2
D. A–4, B–1, C–2, D–3

Answer: A
Explanation: Each GM crop was developed with specific traits to improve nutritional value or shelf life.

Q20. Which of the following methods was used to produce the first recombinant insulin?

A. Using yeast as a vector
B. Using human pancreas directly
C. Synthesizing insulin chains A and B separately in E. coli
D. Using pigs and cattle

Answer: C
Explanation: Chains A and B were produced separately in E. coli, then chemically combined to form insulin.

Q21. Assertion (A): Transgenic animals can be used as models for human diseases.
Reason (R): Human disease-causing genes can be introduced into animals.

A. Both A and R are true, and R is the correct explanation
B. Both A and R are true, but R is not the correct explanation
C. A is true, R is false
D. Both A and R are false

Answer: A
Explanation: Transgenic mice are often used to study genetic diseases like cancer and cystic fibrosis.

Q22. Which of the following statements is incorrect about genetically modified (GM) crops?

A. They can be engineered for herbicide tolerance
B. They can be engineered to increase nutritional value
C. They always cause allergies
D. They can reduce post-harvest losses

Answer: C
Explanation: Not all GM crops cause allergies; many are tested thoroughly for safety.

Q23. RNA interference (RNAi) involves:

A. Use of antisense RNA to degrade DNA
B. Binding of double-stranded RNA to prevent translation
C. Synthesis of mRNA from tRNA
D. Deletion of entire genes from the genome

Answer: B
Explanation: RNAi silences specific genes by using dsRNA to degrade the target mRNA.

Q24. Which of the following is a key use of genetically modified Saccharomyces cerevisiae?

A. Production of monoclonal antibodies
B. Production of hepatitis B vaccine
C. Production of Bt toxin
D. Production of insulin

Answer: B
Explanation: Saccharomyces cerevisiae (baker's yeast) is used in producing the recombinant hepatitis B vaccine.

Q25. Which of the following is patented biotechnological product?

A. Bt brinjal
B. Drosophila
C. E. coli
D. Human embryo

Answer: A
Explanation: Bt brinjal is a genetically modified vegetable that has undergone patenting procedures.

Q26. Match the following:

Application area	Biotechnology product
A. Agriculture	1. Bt cotton
B. Medicine	2. Insulin
C. Nutrition	3. Golden rice
D. Environment	4. Bioremediation bacteria

A. A–1, B–2, C–3, D–4
B. A–2, B–1, C–4, D–3
C. A–3, B–4, C–2, D–1
D. A–4, B–3, C–1, D–2

Answer: A
Explanation: Each biotechnological development has a specific application area.

Q27. Statement I: Agrobacterium tumefaciens is used to create transgenic dicots.

Statement II: It is a natural genetic engineer that transfers genes into plant cells.

A. Only Statement I is true
B. Only Statement II is true
C. Both statements are true
D. Both statements are false

Answer: C
Explanation: A. tumefaciens is used to transfer genes using its Ti plasmid.

Q28. Assertion (A): Transgenic animals help in the production of useful biological products.
Reason (R): Genes encoding desired proteins can be inserted into the genome of animals.

A. Both A and R are true, and R is the correct explanation
B. Both A and R are true, but R is not the correct explanation
C. A is true, R is false
D. Both A and R are false

Answer: A
Explanation: Transgenic animals like sheep and cows are used to produce human proteins.

Q29. What is biopiracy?

A. Use of bioreactors without permission
B. Stealing of genetically modified organisms
C. Commercial exploitation of biological resources without permission
D. Illegal use of recombinant enzymes

Answer: C
Explanation: Biopiracy refers to using indigenous biological resources without authorization or benefit sharing.

Q30. Which of the following best defines “biopatent”?

A. Patent over a new breed of animal
B. Patent over a biological material or process
C. Patent over antibiotics
D. Patent over chemical fertilizers

Answer: B
Explanation: Biopatents refer to legal rights over biological substances or techniques used in biotechnology.

Q31. Golden rice is genetically engineered to synthesize which of the following?

A. Vitamin B12
B. Vitamin A
C. Vitamin K
D. Vitamin D

Answer: B
Explanation: Golden rice contains beta-carotene, a precursor of Vitamin A, to combat vitamin A deficiency.

Q32. Which of the following acts as a vector in gene therapy?

A. Agrobacterium
B. Retrovirus
C. Plasmid
D. Bacteriophage

Answer: B
Explanation: Retroviruses are commonly used as vectors in gene therapy due to their ability to insert genetic material into host cells.

Q33. Which of the following proteins is used in transgenic tobacco to develop resistance to virus?

A. Interferon
B. Coat protein of the virus
C. Cry protein
D. Polymerase

Answer: B
Explanation: Expression of viral coat protein genes in transgenic tobacco confers resistance to the corresponding virus.

Q34. Which of the following is correctly matched?

A. Transgenic cow – Human growth hormone
B. Transgenic sheep – Insulin
C. Transgenic goat – Antithrombin
D. Transgenic mouse – Vitamin K

Answer: C
Explanation: Transgenic goats have been used to produce antithrombin, a blood clotting inhibitor.

Q35. Assertion (A): RNAi is used to develop resistance to nematodes in plants.
Reason (R): RNAi leads to gene expression by enhancing mRNA translation.

A. Both A and R are true, and R is the correct explanation
B. Both A and R are true, but R is not the correct explanation
C. A is true, R is false
D. Both A and R are false

Answer: C
Explanation: RNAi silences gene expression by degrading mRNA, not enhancing translation.

Q36. Which of the following is not a product of genetic engineering?

A. Human insulin
B. Monoclonal antibodies
C. Bt toxin
D. Interferon

Answer: B
Explanation: Monoclonal antibodies are produced using hybridoma technology, not genetic engineering.

Q37. Match the following biotechnological tools with their uses:

Tool Use

A. Recombinant DNA 1. Gene cloning
B. PCR 2. Amplification of DNA
C. ELISA 3. Disease diagnosis
D. Electrophoresis 4. Separation of DNA fragments

A. A–1, B–2, C–3, D–4
B. A–2, B–1, C–4, D–3
C. A–3, B–4, C–1, D–2
D. A–4, B–3, C–2, D–1

Answer: A
Explanation: Each tool plays a distinct role in biotechnology techniques and applications.

Q38. Which one of the following is not an application of biotechnology?

A. Production of novel vaccines
B. Development of drought-resistant crops
C. Cloning endangered animals
D. Preparation of alloys

Answer: D
Explanation: Preparation of alloys is a metallurgical process, not related to biotechnology.

Q39. Statement I: Bt crops are toxic to humans.
Statement II: Cry proteins are activated in acidic human stomach.

A. Only Statement I is correct
B. Only Statement II is correct
C. Both statements are correct
D. Both statements are incorrect

Answer: D
Explanation: Cry proteins are activated in alkaline gut of insects, not in humans; hence, Bt crops are safe.

Q40. Which of the following is not a feature of genetically modified crops?

A. Enhanced yield
B. Increased allergenicity
C. Disease resistance
D. Tolerance to abiotic stress

Answer: B

Explanation: GM crops are generally designed to reduce allergenicity and increase safety and productivity.

Q41. Assertion (A): Gene therapy is permanent.
Reason (R): Genes are inserted into somatic cells only.

A. Both A and R are true, and R is the correct explanation
B. A is false, R is true
C. A is true, R is false
D. Both A and R are false

Answer: B
Explanation: Since gene therapy is done in somatic cells, it is not inherited and hence not permanent.

Q42. What is the goal of biofortification?

A. To reduce pest attack
B. To increase the shelf life
C. To enhance the nutritional content of crops
D. To improve appearance of crops

Answer: C
Explanation: Biofortification is the process of increasing nutritional quality of crops.

Q43. In 2002, which country was the first to approve commercial production of Bt cotton?

A. China
B. India
C. USA
D. Brazil

Answer: B
Explanation: India was the first to approve Bt cotton for commercial cultivation in 2002.

Q44. Match the following transgenic organisms with their applications:

Organism Application

A. Rosie (cow) 1. Lactose-free milk
B. Dolly (sheep) 2. First cloned animal
C. Transgenic goat 3. Production of therapeutic protein
D. Transgenic mouse 4. Disease model for cancer

A. A–1, B–2, C–3, D–4
B. A–2, B–3, C–4, D–1
C. A–3, B–1, C–2, D–4
D. A–4, B–3, C–1, D–2

Answer: A
Explanation: These organisms represent landmark applications of transgenic biotechnology.

Q45. The pest-resistant GM variety of brinjal is developed using which gene?

A. cry1Ac
B. Bt2
C. herbA
D. ins1

Answer: A
Explanation: Bt brinjal was developed using cry1Ac gene from Bacillus thuringiensis for pest resistance.