ANSWERS

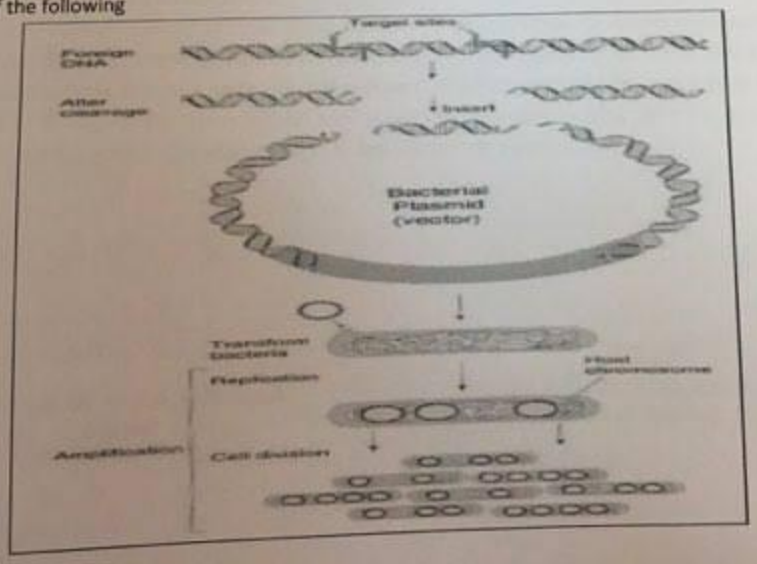
Q1 Match the contents in list A with the suitable in list B. (20 M)

list A	list B
Somatic Gene therapy	Not move to the patient's offspring
Pro542 protein	HIV infection
X-ray film	DNA probe
Sticky ends	Restriction enzymes
No net charge	Isoelectric point
Immunotherapy	Medical Biotechnology
Heat exchangers	Fermentor
Liposomes	Submicron diameters
rBST	Increase in milk production
10. Increase iron content Transgenic rice	Ferritin gene

Q2 Answer with true and false of the following. (20 M)

1. The second major phase of microbial growth is the lag or exponential phase. f
2. Tertiary structure of proteins: Arrangement in space of 2 or more polypeptide subunits. f
3. Prokaryotes contain a large amount of nucleic acids in order to maintain exponential growth. t
4. Vaccines are dead, attenuated organism or proteins derived from them. t
5. Bacteriophages T4, viruses used as vectors in gene therapy. t
6. Enzymes, hormones were produced by hybridoma technology with huge quantities. t
7. HindIII is restriction enzyme; it acts specifically on AAGCTT yielding single stranded fragments t
8. Buffers should be stable and resistant to enzymatic degradation. t
9. Discovery of PCR one of important milestone contributed in advanced of Biotechnology. t
10. A bioreactor differs from a fermentor in that the former is used for the mass culture of plant or animal cells. t

Q3 Mention of the following



b.

Nutrient	Raw materials
Carbon source	
Glucose	Corn sugar, Starch and Cellulose
Sucrose	Sugarcane, sugar beet molasses
Lactose	Milk whey
Fat	Vegetable oil
Hydrocarbon	Petroleum fractions
Nitrogen source	
Protein	Soybean meal, Corn steep liquor, Distillers soluble
Ammonia	Pure ammonia or ammonium salts
Nitrate	Nitrate salts
Nitrogen	Air
Phosphorus sources	Phosphate salts

Q4 Explain two of the following

a.

A large number of genetic or metabolic diseases can be corrected by the supplying proteins or factors. Following the advancement in the biotechnology, many other proteins or factor are produced in different bacterial expression systems (Table1). In an approach, gene of the enzyme or proteins factor is cloned into the appropriate plasmid to produce recombinant clone, for example: production of **human insulin**. Insulin is a dimer of an A chain and B-chain linked by disulphide bonds, composed of 51 amino acids with a molecular weight of 5808 Dalton. A schematic presentation of steps in insulin production is given in Figure 1. In this process, gene A and B is cloned into the bacterial plasmid separately to produce two recombinant clones. Peptide hain A and B is over-expressed in the *E.coli* and recombined together to produce functional insulin.

b.

Plants are under continuous exposure to the pathogenic organism and the environmental conditions. Pathogenic organisms (bacteria, fungi, mycoplasma, and virus) attack on plants to gain nutrients for their growth and disturb its metabolism to exhibit pathological symptoms.

Plants have R gene (resistance gene) which produces R protein and these virulence factors allow acquiring resistance to combat pathogens. Every R gene recognizes pathogen protein in a receptor-ligand fusion and as a result R gene product provides resistance against a particular pathogen or a family of related pathogens. R gene has the ability to modify its product to acquire resistance against new species of pathogen. A good example includes barley MLO against powdery mildew, wheat Lr34 against leaf rust, and wheat Yr36 against stripe rust.

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