University of Baghdad
College of Science
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Competition examination for Ph.D candidates in Biotechnology 2019-2020

Q1: Choose the correct answer : (60 mark)

Bioseperation

1- Proteins separation be carried out on the basis of
a. Net charge
b. Solubility in salt solution
c. Size of mass
d. All of these

2- The best way to determine the location of protein in the purification scheme is to measure the
a. Rate of ATP synthesis
b. Changes in the reflective index
c. UV. absorption
d. Mass spectroscopy of the protein

3- By adding SDS during the electrophoresis of proteins, it is possible to:

a. Determine a protein's isoelectronic point

b. Determine an enzyme's specific activity
c. Determine Amino acids composition of the protein.
d. Separate proteins exclusively on the basis of MW.

4- The use of insulin hormone to purify its receptor is an example of :

a. Ion exchange chromatography
b. Affinity chromatography
c. Gel filtration chromatography
d. Ligand mediated chromatography

5- Metal chelate affinity chromatography is the best technique for separation
a. DNA and RNA
b. Recombinant protein
c. Lactose

d. Both a and b

6- In electrophoresis ,DNA will migrate towards:

a. Cathode or positive electrode
b. Anode or negative electrode
c. Cathode or negative electrode
d. Anode or positive electrode

Microbial fermentation technology:

7- Microbial enhanced oil recovery is one of the application of ---------- biotechnology.

a. Environmental
b. industrial
c. mining

8- Primary metabolite, such as polysaccharide, is----------

a. growth related
b. not growth related
c. substrate limited.

9- The high value and low concentration products of microorganisms like----------.

a. polysaccharide
b. antibiotics
c. single cell protein

10- ---------- is a bioreactor that microorganism's growth occurs on support media.

a. Fluidized-bed reactor
b. Fixed-bed reactor
c. continuous bioreactor

11- In many organisms, 80% of the glucose used for citric acid biosynthesis is broken down by reactions of the ----------pathway.

a. Emben - Meyerhof-parnas
b. pentose phosphate cycle
c. phosphoketolase

12- Toxic limitation and substrate limitation of growth is take place in----------.

a. . log phase

b. lag phase

c. stationary phase.

Fermentation technology and bioprocess

13- The material of fermentor construction is usually selected on the basis that it displays the following physical:

a. It must be chemically inert
b. Does not leach elements into the medium or chelate elements from the medium
c. It can withstand repeated sterilization cycles.
d. all the above.

14- Microbial population maintained in _____ phase for long time using continuous culture system

a. lag
b. Log
c. Exponential
d. decline

15- Where the product is highly viscous, the fermentation system that usually preferred to reduce the broth viscosity is …….

a. Continuous culture
b. Batch culture
c. Submerged culture
d. Fed batch culture

16- In Fed Batch culture:

a. substrates are added to the system all at once and runs until product is harvested
b. nutrients are continuously fed into the reactor and the product is siphoned off during the run
c. a fresh nutrient is fed into the fermentor during the fermentation without the removal of the culture fluid
d. None of these.

17- Laboratory fermenters are a more sophisticated version of the shake flask system the following benefits:

a. The option of controlling pH using acid and base.

b. The option of feeding nutrients using continuous designs.
c. The option of using off-gas monitoring.
d. All the above.

18- The physiological behavior of the microorganism varies during growth and it largely depends on

a. the bioreactor used in the process
b. type of the microorganism used.
c. the composition of the culture media
d. none of the above.

Advanced Genetic engineering

19- The gene transfer occurs by

a- transformation
b- transduction
c- cell fusion
d- all of above

20- An Hfr strain of E. coli contains:

a- A vector of yeast or bacterial origin which is used to make many copies of a particular DNA sequence

b- A bacterial chromosome with a human gene inserted

c- A bacterial chromosome with the F factor inserted

d- A bacterial chromosome with gene of interest

21- Plasmids are important in biotechnology because they are

a- A vehicle for the insertion of recombinant DNA into bacteria.

b- Recognition sites on recombinant DNA strands.

c- Surfaces for protein synthesis in eukaryotic recombinants.

d- Surfaces for respiratory processes in bacteria.

22- Screening for proteins in recombinant colonies occur by

a- in situ hybridization method

b- immunological method

c- insertion inactivation of Lac Z

d- insertion inactivation of antibiotic resistance

23- The cloning vector contain an origin of replication is

a- plasmid

b- cosmid

c- lambda phage

d- a and b

24- Transfer of the DNA in the plaque or colony to nitrocellulose filter is

a- the first step of hybridization screening experiment

b- the first step of immunological screening experiment

c- the last step of hybridization screening experiment

d- none of above

Advanced molecular biology

25- The enzyme that relieves twists in DNA ahead of the replication fork is

a- DNA polymerase

b- RNA polymerase

c- Primase

d- Topoisomerase

e- Helicase

26- Which of the following nucleoside base is NOT found in DNA?

a. Adenine

b. Guanine

c. Thymine

d. Cytosine

e. Uracil

27- Which of the following statements about the genetic code are CORRECT?

a. All codons specify more than one amino acid.

b. The genetic code is degenerate.

c. All amino acids are specified by more than one codon.

d. The genetic code is different in prokaryotes and eukaryotes.

e. All codons specify an amino acid.

28- Untranslated Regions (UTRs) are:

a. Found only in the 5' region

b .Found in both 5' and 3' regions

c. Key regulatory regions

d. Not transcribed but translated

e. Functionally not important

29- RNA is synthesized on a DNA template in a process called _____, which utilizes the enzyme_____ .

a. translation, RNA polymerase

b. transcription, DNA polymerase

c. transcription , RNA polymerase

d. replication, DNA polymerase .

30- Which of the following is NOT a necessary component of translation?

a. anticodon

b. mRNA

c. ligase

d. amino acid

Plant Biotechnology

31- Isoflavonoids are known to

a. act as phytoalexins

b. act as insecticides

c. cause infertility in mammals especially sheep

d all of the above

32- The influence of chemicals released by one plant species on another plant or animal species with resulting benefits to the species which contain them, is called as,

a. allopathy

b. allelopathy

c. homoeopath

d. none of the these

33- Molecular target of some alkaloids is

a.Biomembrain

b. Protein

c. DNA

d. both b and c

34- Which of the following is commonly used in transfer foreign DNA into crop plants

a. *Penicillium expansum*

b. *Tricoderma harzianum*

c. *Meloidogyne incognita*

d. *Agrobacterium tumefaciens*

35- Virulence trait of Agrobacterium tumefaciens is born on

a. chromosomal DNA

b.tumor inducing plasmid DNA

c. both a and b

d. cryptic plasmid DNA

36- Advantages of micro projectile method over microinjection method for gene transfer in plant include

a. intact cells are used

b .method is universal in its application irrespective of all shape, size, type and presence and absence of cell wall

c. gene can be transferred to many cells simultaneously

d. all of the above

Advanced pathogenic bacteria

37- The colonies produced by Pseudomonas on MacConkey's medium are

a- Purple coloured

b- Colourless

c- Green coloured

38- The identification of bacteria by serologic tests is based on the presence of specific antigens which of the following bacterial components is least likely to contain useful antigen?

a- Capsule

b- Flagella

c- Ribosomes

39- The synthesis of erythrogenic toxin by specific strains of group A streptococcus is determined by a

a- Bacterial chromosomal gene

b- Gene carried by a lysogenic phage

c- Specific virulence plasmid

40- An outbreak of sepsis caused by Staphylococcus aureus has occurred in the newborn nursery. According to your knowledge of the normal flora, what is the most likely source of the organism?

a- Nose

b- Colon

c- Throat

41- Cell wall of gram-negative bacteria is

a- Thick

b- Lipids

c- Teichoic acids are absent

42- The useful tool for detecting hospital outbreak source of *S. aureus* is:

a- Gram reaction

b- Phage typing and antibiogram

c- Coagulase test

Immunotechnology:

43- The immunogenicity of an antigen depends greatly on:

a. Its biochemical composition

b. Being structurally unstable

c. Its degree of foreignness

d. Having a low molecular weight

44- Antibodies are also referred to as:

a. Immunoglobulins

b. Haptens

c. Epitopes

d. Gamma globulins

45- Bonding of antigen to antibody exists exclusively as:

a. Hydrogen bonding

b. Van der Waals forces

c. Electrostatic forces

d. Noncovalent bonding

46- The strongest bond of antigen and antibody chiefly results from the:

a. Type of bonding

b. Goodness of fit

c. Antibody type

d. Quantity of antibody

47- Monoclonal antibodies have all the following characteristics except:

a. Purified antibodies

b. Cloned from a single cell

c. Engineered to bind to a single specific antigen

d. Frequent occurrence in nature

48- The principal type of leukocyte in the process of phagocytosis is the:

a. Eosinophil

b. Basophil

c. Monocyte

d. Neutrophil

Advanced cytogenetic

49- The telomere sequence in human is…

a- TTAGGG

b- TAAGGG

c- GGGAAT

50- Sister chromatids separate to opposite poles of cell at the …….phase.

a-Anaphase

b- prophase11

c-metaphase 11

d- telophase

51- The most common autosomal aneuploid among liveborns is trisomy 18, that an euoploid reveals syndrome called …….

a- Patau

b- Edward

c- Down

52- Syndrome that caused by missing one sexsomal chromosome is..

a- Algalia

b- Edward

c- Turner

53- Phaladelipha chromosome occurs as a result of chromosome structure abnormality

a-ring chromosome

b- inversion

c- translocation

54- One example Syndrome that caused by an euploidy of sexsomal chromosome is

a- Klinefelter

b- patau

c- Down

55- Aflatoxin B1 and B2 appear:

A- Green florescence under UV light.

B- Blue florescence under UV light.

C- Non- florescence under UV light

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56- The main patulin producer is:

A- *Penicillium expansum*

B-*Penicillium fumigatus*

C-*Penicillium notatum*

57- Aflatoxin D1 derived from reaction of aflatoxin B1 with:

A- Heated ammonium sulfite.

B-Heated ammonium chloride.

C- Heated ammonium hydroxide.

58- - Mycotoxins are:

A- Immunogenic substance.

B- Non- immunogenic substance.

C- Hapten.

59- The chemical structure of mycotoxin is:

A-Sequence of amino acids

B- Protein with carbohydrate

C- Polyketide

60- Detoxification of mycotoxins can occur by:

A- Chemical agent.

B- Physical agent.

C- Both agents above

Q2/Answer the following questions: (40 mark)

Bioseperation

1- List the methods that have been eluted the bounds protein in hydrophobic affinity chromatography

Microbial fermentation technology:

2- Mention the advantages of enzymes production by microorganisms instead of animal and plant enzymes.

Fermentation technology and bioprocess

3- What is air lift bioreactor? For which purpose is usually used and why?

4- Three techniques should be available when considering the insertion of a piece of foreign DNA into vector. Discuss them.

5- Name two differences between DNA replication and DNA transcription.

6- Write an essay on the basic idea of herbicide resistant plants.

Advanced pathogenic bacteria

7- List the two types of toxins and provide at least 3 examples of diseases that cause sickness with toxins.

Immunotechnology:

8- Answer the following questions

1. Define immunoglobulin , list its isotypes and their location

2. what are MHC types and mention its roles

Advanced cytogenetics

9- Mention the causes of Down syndrome, and clarify how some patients of Down syndrome have 45 chromosomes?

Advanced mycology

10- Write the principle of competitive ELISA which is used for mycotoxin detection.