University of
Baghdad
College of

Biotechnology
Department
Time: Three hours

Competition examination for PhD candidates in Biotechnology

2015 – 2016

Q1- Select the best answer for the following question:

1. **If starch containing substrates used for ethanol production. Yeast strain cannot be used directly because:**
   a. It doesn't contain amylase to hydrolyze starch.
   b. Starch is not a suitable subtract for the ethanol production.
   c. It is not converted to pentose sugar.
   d. None of above.
2. **Penicillin is produced by:**
   a. Aerobic fermentation.
   b. Anaerobic fermentation.
   c. Aerobic fermentation followed by anaerobic fermentation.
   d. Aerobic fermentation followed by aerobic fermentation.
3. **After the fermentation is over, ethanol is recovered by:**
   a. Centrifugation.
   b. Distillation.
   c. Filtration.
   d. Cell disintegration.
4. **In submerge process for the fermentation to produce citric acid :**
   a. A.niger is used with solid subtract as sweet potato.
   b. A. niger float on the surface of solution.
   c. Fungal mycelium grows throughout the solution in deep tank.
   d. Both "a" and "b".
5. **The first therapeutic product formed by means of recombinant DNA technology is:**
   a. Human growth hormone.
   b. Insulin
   c. Hapatitic B Vaccine.
   d. Vaccine for foot and mouth disease.
6. **During success purification scheme ,this may be expected that the:**
   a. Specific activity increase.
   b. Specific activity decrease.
   c. Number of portions in the sample decreases.
   d. Both "a" and "b".
7. **Affinity chromatography deals with the;**
   a. Specific binding of protein interaction constitute for another molecule.
   b. Portion- portion interaction.
   c. Portions – carbohydrate interaction.
   d. None of above.

8. **The best way to determine the location of protein in the purification scheme is to measure the :**
   a. Rate of ATP synthesis.
   b. Change in the reflective index.
   c. Change in the reflective index.
   d. UV absorption.

9. **In the isoelectric focusing separation of protein are based on:**
   a. Relative content of positively charged groups.
   b. Relative content of negatively charged groups.
   c. Both "a" and "b".
   d. Ph.
   e. None of these.

10. **By adding SDS (sodium dodecyl sulfate) during the electrophoresis of portions, it is possible to:**
   a. Determine protein's isoelectric point.
   b. Determine an enzyme's specific activity.
   c. Determine amino acids composition of the protein.
   d. Preserve a protein's native structure and biological activity.
   e. Separate proteins exclusively on the basis of molecular weight.

11. **The useful tool for detection hospital outbreak source of S. aureus is :**
   a. Gram reaction.
   b. Coagulase test.
   c. Phage typing and antiprogram.

12. **Pneumococci can be the differentiated from S. viridans by:**
   a. Hanging-drop preparation.
   b. Opetochin sensitivity.
   c. Fermentation of sugar.

13. **Salmonella differs from shigella in which of the following propesties:**
   a. Presence of a capsule.
   b. Shape of spore forms.
   c. Motility.

14. **A distinguishing features of human mycoplasma species is what they:**
   a. Stain well with Giemsa, but not by gram stain.
   b. Contain no bacterial peptidoglycan.
   c. Cannot be cultivated in vitro

15. **Hydronidase is a bacterial enzyme that:**
   a. Convert toxin to toxoid.
   b. In disease blood clot formation in the host.
   c. Enhances penetration through the host tissue.

16. **Wooping cough is a result of bacterial infection by**
   a. Bordetella pertussis.
   b. Cory nebacterium diphthereae
   c. Mycobacterium lepra

17. **Lustria moncytogenes show which of the following characterization?**
    a. It is an extracellular pathogen
    b. It is a catalase negative
    c. It can grow at refrigerator temperature 4°C
18. **Which statement describing the potential advantages of DNA technique over conventional culture – based methods is not thus?**
    a. Potential more sensitive deletion
    b. Greater sensitivity of surface during transport
    c. More complete and accurate determination of organism resistance to antibiotics
19. **The weserman reaction is based on the measurement of:**
    a. Gamma globulins
    b. Regain
    c. TPI antibodies
20. **Enterotoxin causing increasing a damage cycles activity is produce by :**
    a. Viberio cholerea
    b. Salmonella enteritids
    c. Shigella dysenteriae
21. **In human class 11 molecular are express by**:
    a. All nucleated cells.
    b. B cells, dendritic cells, and microphages.
    c. Mark cells.
22. **The failure to inactivate or eliminate self – reactive cells results in:**
    a. Negative selection.
    b. Autoimmunity
    c. Tolerance.
23. **Natural killer cells are:**
    a. B cells that kills without complement.
    b. Cytotoxic T cells.
    c. Increased by immunization.
24. **Which one of the following substance is not released by activated helper T cells?**
    a. Interleukin -1
    b. Gamma interferon
    c. Interleukin -2
25. **Graft and tumor rejection are mediated primarily by :**
    a. Phagocytic cells
    b. Helper T cells
    c. Cytotoxic T cells
26. **Antibodies that render the autogenic infection agent non infection are referred to as:**
    a. C4b
    b. C1qr.s
    c. C5b

27. **The combs test**
    a. Is of little clinical significance
    b. Is useful in demonstrating non agglutinating antibodies in certain hemolytic diseases
    c. Is a test for direct heating bilirubin

28. **Pattern recognition receptors bind to:**
    a. Band T lymphocytes.
    b.MHCI molecular
    c. Pathogen- associated molecular patterns

29. **Contact dermatitis is usually caused by all the following EXCEPT:**
    a. Cosmetic
    b. Detergents
    c. Infectious agents

30. **Pattern recognition receptors bind to :**
    a. B and T lymphocytes
    b. MHCI molecule
    c. Pathogen –associated molecular patterns

31. **Maximum energy produced by:**
    a. Fats.
    b. Carbohydrates.
    c. Proteins.
    d. Nucleic acids.

32. **Acyl carrier protein is involved in the synthesis of:**
    a. Proteins.
    b. Glycogen.
    c. Fatty acid outside the mitochondria.
    d. Fatty acid inside the mitochondria.

33. **A pathway that required NADPH as cofactor is:**
    a. Fatty acid oxidation.
    b. Extra mitochondria denovo fatty acids synthesis.
    c. Ketone bodies formation.
    d. Glycogenesis.

34. **The most important source of reducing equivalents for FA synthesis on the liver is:**
    a. glycolysis
    b. HMP-shunt
    c. TCA cycle
    d. Uronic acid pathway.

35. **Long chain fatty acyl CoA esters are transported across the mitochondrial membrane by:**
    a. cAMP
    b. prostaglandin
    c. carnitine
    d. Choline.

36. The energy yield from complete oxidation of products generated by second reaction cycle of □-oxidation of palmitoyl CoA will be:

a. 5ATP
b. 12 ATP.
c. 17 ATP
d. 34 ATP.

37. Oxidative degradation of acetyl CoA in the citric acid cycle gives a net yield of all the following except.

a. FADH2
b. 3 NADH
c. 2 ATP
d. 2CO2

38. The main source of reducing equivalents (NADPH) for lipogenesis is:

a. Pentose phosphate pathway
b. Citric acid cycle
c. Glycolysis
d. Glycogenolysis.

39. In lineweaver-burk plot, the y-intercept represents:

a. Vmax
b. Km
c. 2km
d. 1/km

40. Competitive inhibitors:

a. Decrease the km
b. Decrease the V max
c. Increase the km
d. Increase the V max

41. Pyruvate is converted into acetyl-CoA by:

a. Decarboxylation.
b. Dehydrogenation
c. Oxidative decarboxylation
d. Oxidative deamination

42. Oxidation of fatty acids is inhibited by:

a. NADPH
b. Aceryl CoA
c. Malonyl CoA
d. None of these.

43. A substance for enzyme aldolase is:

a. Galactose -6- phosphate.
b. Isocitric acid
c. Glocuse -1-phosphate
d. Fructose1, 6 diphosphate.

44. Urea is produced physiologically by the action of the enzyme:

a. Ureas.
b. Glutaminase
c. Arginease
d. None of these

45. In non-competitive enzyme action:

a. V max is increased
b. Apparent km is increased
c. Apparent km is decreased
d. Concentration of active enzyme molecule is reduced.

46. Key and lock proposed by fisher implies that:

a. The active side is flexible and adjusts to substrate.
b. The active site required remover of PO4 group.
c. The active site is complementary in shape that of the substrate.
d. Substrate change conformation period to active side interaction.

47. Enzymes increase the rate of interaction by:

a. Increasing the free energy of activation.
b. Decreasing the free energy of activation.
c. Changing the equilibrium constant of the reaction
d. Increasing the free energy change of the reaction.

48. The Michaels constant, km:

a. Numerically is equal to 1/2 Vmax
b. Dependent on the enzyme concentration.
c. Independent of pH
d. Numerically equal to the substrate concentration that gives half maximal velocity.

49. The energy required to start an enzymatic reaction is called:

a. Chemical energy
b. Metabolic energy
c. Activation energy
d. Potential energy.

50. Which one of the following enzyme is common to both glycolysis and gluconeogenesis?

a. Pyruvate kinase
b. Pyruvate carboxylase
c. Hexokinase
d. Phosphoglycerate kinase
e. Fructose-1,6 –bisphosphates.

51. The production of the secondary metabolites requires the use of:

a. Protoplast.
b. Cell suspension.
c. Meristem
d. Auxiliary buds.

52. Electroporation is a technique used with:

a. Callus
b. Protoplast
c. Pollen
d. Organs

53. Created through the shikimic acid pathway it contains a hydroxyl attached to an aromatic ring:

a. Alkaloids
b. Terpenoids
c. Phenolic

54. If you used a plant tissue culture as a chemical factory for vitamins choose:

a. Suspension culture
b. Callus culture
c. Organ culture
d. Protoplast culture.

55. Plant transformation is:

a. When a plant grown in culture generates increased genetic variation.
b. When plat cell in suspension cultures from individual embryos that can grow into plants.
c. The incorporation of foreign DNA into the plant gerome.
d. When differentiated callus cells develop into tissue that is different from the original source tissue.

56. Bacillus thuringiensis is used to control:

a. Nematodes
b. Fungal pathogens.
c. Bacteria.
d. Insect pests.

57. Hairy root cultures of secondary metabolites production are induced by transformation plant cells with:

a. Virus.
b. Agrobacterium tumefaciens.
c. Bacillus thuringiensis.
d. Agrobacterium rhizogenes.

58. The variation in invitro culture is called as:

a. Ivitro variation.
b. Mutation
c. Somaclonal variation.
d. All of these.

59. Immobilized cell bioreactors are based on:

a. Cells culture in solid medium.
b. Cells cultured in liquid medium.
c. Cells entrapped in gels.
d. All of these.

60. Which vector is mostly used in crop improvement?

a. Plasmid.
b. Cosmid
c. Phasmid
d. Agrobacterium.

61. **Down** syndrome thought to be genetic disease because their cells have

a. barr bodies
b. polyploidy
c. trisomy

62. The most common autosomal aneuploid among liveborns is trisomy 21, that an euoploid reveals syndrome called.....

a. Patau
b. Turner
c. Down

63. Klinefelter syndrome thought to be genetic females because their cells have ....,

a. Barr body
b. Chromosome break
c. Ring chromosome.

64. Sister chromatids separate to opposite poles of cell at the .....phase.

a. Anaphase
b. prophase11
c. metaphase 11
d. telophase

65. The chromosomes classified according to centromer position and chromosome arms length to groups , except one group that cannot found in human ,it is

a. telocentric
b. submetacentric
c. metacentric
d. acrocentric

66. Insertion of a single base in a DNA sequence results in what kind of mutation?

a. Transition
b. Deletion
c. Frame shift mutation
d. Translocation

67. DNA is called the blueprint of life because:

a. It contain the plans for building an organism
b. It is like fingerprint to other cells
c. It can relay massages
d. It has a bright blue color

68. The scientist who first showed that genetic material is a heat stable chemical is

a. Franklin Griffith
b. Erwin Chargaff
c. Friedrich Miescher
d. Oswald Avery

69. The two polynucleotide chains in DNA are :

a. Semidiscontinuous
b. Semiconservative
c. Parallel
d. Discontinuous
e. Antiparallel

70. The amino acid sequence of polypeptide chain comprise the structure of protein:

a. Tertiary
b. Secondary
c. Quaternary
d. Primary

71. Active transport of material through the cell of microorganisms is:

a. Simple diffusion
b. Nutrient uptake dependence
c. Input of energy.

72. The feature of lag phase of microbial growth in fermentation process, is:

a. Increase in the number of cells
b. Adaptation to new environment
c. Increase in the product formation.

73. Toxic limitation and substrate limitation effects on microbial growth in:

a. Stationary phase
b. Exponential phase
c. Decline phase.

74. ---------- fermentation is operated by bacteria such as *Lactobacillus acidophilus* which reduce virtually all pyruvate generated by glycolysis to lactic acid.

a. Homolactic
b. Heterolactic
c. Mixed acid fermentation.

75. One of the most important microbial polysaccharides used in immobilization process is:

a. Alginate
b. Xanthan gum
c. dextran

Q2 A) - What are the major reasons for developing transgenic plants
B) - What are the rules of agrobacterium in plant transformation?

Q3- Enumerate three main groups of alkaloids.

Q4- Indicate the role of each of the following in DNA replication

1- Topoisomerase
2- Helicase
3- Primase
4- Ligase

Q5 A)- Numerate the ways have been used by a couple to confirm a checking fetus chromosome in a pregnant woman is healthy?
B)- Mention three levels of genetic refers to the studies the comparing DNA sequences for individual genes that causing disease by mutation or others provide variation.

Q6-Illustrat how to clone cDNA for certain gene? Why the scientist prefer to use this technique especially in Eukaryotic research

Q7 -Define five only of the following :

Blast , stiky end , pb, rDNA, ORF, Agrose, cosmid , dNTP

Q8 -Compare between batch and continuous culture system according to: (only five)

1. **Quantity of product**
2. **Downstream process and cost**
3. **Fresh medium supplement**
4. **Steady state**
5. **Microorganisms stability (genetic stability)**
6. **Possibility of contamination**