**University of Baghdad**
**College of Science**
**Department of Biotechnology**
**Date: 23 / 6 / 2019**

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# Competition examination for M.Sc. candidates in Biotechnology 2019-2020

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## Q1: Choose the correct answer: (60 mark)

### Basics of Biotechnology

**1-** Which immobilized enzyme needs to be used to milk lactose free
   a. Lipase
   b. protease
   c. amylase
   d. lactase

**2-** Golden rise is a transgenic crop of the future with the following improved trait
   a. Insect resistance
   b. High protein content
   c. High vitamin A content
   d. High lysine content

**3-** After the fermentation is over ,ethanol is recovered by
   a. centrifugation
   b. distillation
   c. filtration
   d. cell disintegration

**4-** Which of the following microorganisms is used in microbial mining
*a. Pseudomonas aeruginosa*
*b. Thiobacillus thiooxidans*
*c. Pseudomonas putida*
*d. Zoogloea ramigera*

### Microbial and environmental biotechnology

**5-** . Resistance of compounds to biodegradation increase with increasing ----------.
a. Aliphatic compounds b. Aromatic compounds c. polyaromatic compounds.

**6-** ----------that involves microbial cell-surface uptake of metals from waste waters.

a. Bioleaching b. Biosorption c. Biodeterioration

**7-** Bio-stimulation process is accelerate the biodegradation process by addition of ----------

a. indigenous microorganisms b. nutrients c. exogenous microorganisms

**8-** ---------- bacteria is a type of bacteria that produce energy when synthesize their own food.

a. Autotrophic b. heterotrophic c. facultative

## Industrial microbiology and Fermentation

**9-** Where biomass is the target product, the objective is to provide a production medium that…….

a. Allows optimal growth of the microorganism.
b. Provide an initial growth, followed by conditions optimized for secondary metabolite production
c. Allows optimal growth followed by conditions optimized for primary metabolite production
d. All the above

**10-** As a biotechnologist, you understand the fermentation as:

a. life without air.
b. an energy-generating process in anaerobic conditions.
c. process of producing a product by microorganisms in anaerobic conditions.
d. process of producing a product by microorganisms in aerobic and anaerobic conditions.

**11-** Batch fermentations are particularly well suited for the production of:

a. non- growth-associated secondary metabolites
b. Antibiotics
c. products formed in idiophase
d. all the above

**12-** When the product is a growth-associated, the fermentation can be terminated:

a. at the end of the exponential growth phase
b. at the end of the stationary phase.
c. before the microbial population start to decline
d. In the idiophase

## Genetic engineering

**13-** What is the cloning vector?

a- The sticky end of a DNA fragment
b- An enzyme that cuts DNA in to restriction fragments
c- The laboratory apparatus used to clone genes
d- An agent, such as a plasmid, used to transfer DNA from an in vitro solution into a living cell

**14-** Self – replicating, small circular DNA molecules present in bacterial cell are known
- a- plasmids
- b- cosmids
- c- plasmomeros
- d- plastids

**15-** Plasmids which are maintained as limited number of copies per cell are known as
- a- Stringent plasmids
- b- Relaxed plasmids
- c- Cryptic plasmids
- d- All of these

**16-** A portion of phage is removed and in place of it, the DNA of interest is inserted. This type of vector is called as _____
- a- displacement vector
- b- insertion vector
- c- replacement vector
- d- transposition vector

## Molecular biology

**17-** The types of DNA Polymerase that remove and replace primer is :

- a- - DNA polymerase 1
- b- - DNA polymerase 111
- c- - DNA polymerase 11
- d- - DNA polymerase- v and - DNA polymerase IV

**18-** The genome of Ecoli has approximately :

- a- 4.600000 base pairs of DNA
- b- 460 Kbp of DNA
- c- 460 K Dalton of DNA
- d- Non all the above

**19-** Individual unit of amplification are called:

- a. amplicon
- b. Repeat of replicons
- c- Repeat of amplicons.
- d- replicon

**20-** The DNA binding proteins in eukaryotes is :

a- histones like Proteins

b- histones Proteins

c- H-US protein

NS protein

## Pathogenic bacteria

**21-** What is the O-antigen of Enterobacteriaceae

a- Cell surface polysaccharide

b- A flagellar protein

c- Cell wall lipopolysaccharide

**22-** Which of the following is not one of Koch's postulates ?

a- The organism is regularly found in lesions of the disease

b- The organism can be isolated from diseased tissue in pure culture on artificial media.

c- Treatment of the disease with a broad spectrum oral antibiotics

**23-** What do endotoxins and exotoxins have in common?

a- Secreted into the medium

b- Cause damage to the host

c- Heat stable

**24-** A common type of nosocomial infection is:

a- Cellulitis

b- Gastroenteritis

c- Urinary tract infection

## Immunology

**25-** What is a characteristic of adaptive immune response and not of the innate response?

a. Physical barriers
b. Chemical barriers
c. Clonal expansion of effector cells
d. Phagocytosis

**26-** Which class of antibody molecule has the ability to cross the placenta?

a. IgG

b.IgA

c.IgM

d.IgD

**27-** Functions of complement include all except:

a.Chemotaxis

b. Opsonization

c. Cell lysis

d. Antigen presentation

**28-** MHC class 1 is present on:

a. All neucleated cells

b. Only on cell of immune system

c. Only on Bcells

d. Only on T cells

## Animal tissue culture

**29-** One of these tissues are more readily and gives higher yield of proliferating cells and culturing in vitro :

a- newborn cells, b- adults tissue, c-embryonic cells

**30-** Classic example of an immortalized cell line is…

a- Hela b- HBN c- Ref

**31-** The traditional culture medium used in cell culture is

a- HAT media b- RPML-1640 c- F12 media

**32-** All cells can cultured and grown in vitro as adherent monolayer, except one of them grown as suspension culture

a-Hep-2 b- Hela c- blood d- Ref

## Cytogenetic

**33-** DNA is replicated during----------.

a. Interphase
b. Mitosis
c. Meiosis
d. Cytokinesis

**34-** Identify the correct order organization of genetic material from largest to smallest.

a. Genome, chromosome, gene, nucleotide.
b. Gene, chromosome, nucleotide, genome.
c. Chromosome, gene, genome, nucleotide.
d. Chromosome, genome, nucleotide, gene.

**35-** ---------- is a programed cell death.

a. mitosis
b. cell cycle
c. apoptosis
d. meiosis

**36-** Alpha satellite DNA is localized at ---------.

e. Telomeres.
f. Centromere.
g. Dark G-band.
h. Light G-band.

## Plant tissue culture and secondary metabolism

**37-** Example of indole alkaloids is
(a) pilocarpine (b) reserpine (c) papaverine (d) all of these

**38-** Most common anthocyanidins in plants are,
(a) pelargonidin (b) delphinidin (c) cyanidin (d) all of these

**39-** Growth hormone producing apical dominance is

(a) auxin (b) gibberellins (c) ethylene (d) cytokinin

**40-** One of the best combination of growth regulators in tissue culture

(a) salt and sucrose (b) glucose and sucrose (c) glucose and salts (d) sucrose and gelatin

## Plant physiology

**41-** Golgi body known as:

a- Golgi apparatus. b- Golgi complex. c- Dictysome. d- All of them.

**42-** The vacuole of plant cell is filled with a watery solution of inorganic, organic substances and gases which known as:

a- Cell solution. b- Vacuole solution. c- Cell sap. d- None of them.

**43-** Boron element deficiency in plant causes:

a- Suppressing of flowering. b- Chlorotic and Necrotic spots. c- Reclamation disease. d- None of them.

**44-** True natural Auxin hormon is:

a- IAA. b- ABA. c- Ethylene. d- 2, 4-D.

## Mycology

**45-** Somatogamy is one method of:

A-Asexual reproduction

B-Sexual reproduction

C-Vegetative reproduction

**46-** Deutromycetes reproduce:

A-Only sexually

B- Only asexually

C- Sexually and asexually

**47-** Chlorophyll pigments are presence in:

A-All fungi

B- Most fungi

C- Fungi have not chlorophyll pigments

**48-** Whittaker in 1969 classified fungi within kingdom:

A- Mycetae

B- Monera

C- Protista

## Food Microbiology

**49-** Jellies and jams are rarely affected by bacterial action.

a) True

b) False

**50-** Which among the following is a gas producer organism?

a) Streptococcus lactis

b) Lactobacillus fermentum

c) Micrococcus luteus

d) Clostridium butyricum

**51-** _____ spoilage of food caused by flavor compound production such as H2S as a result of protein degradation by Proteus spp.

a) Souring.

b) Sulfide odor.

c) Bitterness.

d) Rancidity.

**52-** Contaminated raw vegetables and poor personal hygiene are considered the main causes of _____(intestinal protozoan). The main symptoms of the disease are acute or chronic diarrhea and abdominal pain.

a) Toxoplasmosis by Toxoplasma gondii.

b) Giardiasis by Giardia lamblia.

c) Anisakiasis by Anisakis simplex.

d) Taeniasis by Taenia spp.

## Animal physiology

**53-** Closing the AV valves produces

a. The second heart sound (dub).. b. The first heart sound (lub). c. Both a and b.

**54-** Which of the following structures are involved in pulmonary circulation?.

a The right atrium, right ventricle, and left atrium.

b The left ventricle, aorta, and inferior vena cava.

c The superior vena cava, right atrium, and right ventricle

**55-** The ECG deflection produced during atrial depolarization is

a. The U wave . b. The QRS wave . c. The P wave .

**56-** Neurotransmitters are manufactured by ---------- in neuron cell.

a.Lysosome b. Nissl bodies c. Mitochondria

## Antibiotics

**57-** All of the following antibiotics bind to the 50S subunit of the ribosome thereby inhibiting protein synthesis EXCEPT

a. Chloramphenicol b. Erythromycin c. Tetracycline d. Clindamycin

**58-** Which of the following inhibits DNA gyrase?

a. Penicillin b. Trimethoprim c. Chloramphenicol d. Ciprofloxacin

**59-** Rifampicin

a. Inhibits hepatic microsomal enzymes b. Inhibits DNA synthesis c. Inhibits RNA synthesis

**60-** The first scientist who used the term antibiotic was:

a. Flemming b. Waksman c. Pasteur

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## Q2/Answer the following questions: (40 mark)

**Basics of Biotechnology**

1. Compare between Lag phase and Log phase for bacterial growth

**Microbial and environmental biotechnology**

2. Mention the advantages of the bioremediation of toxic pollutants

**Industrial microbiology and Fermentation**

3. In general, the synthesis of secondary metabolites is usually tightly regulated by the cell. Explain in brief the main regulatory mechanisms or strategies that control secondary metabolism in the microbial cell.

**Genetic engineering**

4. What are the ideal features of cloning vector? Give an example

**Molecular biology**

5- A-What are the two basic types of terminators found in bacterial cells?

B-Describe the structure of bacterial RNA polymerase.

**Pathogenic bacteria**

6- List and describe at least **3** different types of flagellum locations that are used to classify bacteria.

**Immunology**

7- Explain the differences between primary immune response and secondary immune response.

**Animal tissue culture**

8- What are the major differences in cell behavior between normal and tumor cells cultured in vivo?

## Cytogenetic

9- What are the major characteristics of mitosis?

## Plant tissue culture and secondary metabolism

10- What are plant secondary metabolites? List out the main secondary metabolic pathways from primary metabolites .