 جامعة طنطا كلية الصيدلة	Tanta University Faculty of Pharmacy Department of Microbiology		
	Postgraduate Pharmacy Students (Ph. Microbiology Diploma Program)		
	Course coordinators; Prof. Dr/T. El-banna Prof. Dr/ F.Sonbol Dr/ M. Farghali	Industrial Microbiology & Fermentation Technology	Course Code TU10-6145 ^b
Date 15 / 3/2021	Term: First	Total Assessment Marks: 60 Total pages 6	Time Allowed: 2 Hours

Question No.I:

Choose the letter of **ONE** correct statement at the corresponding number in the following answer sheet. (20 points, 0.5 each; 1 hour)

Q	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Ans.																					
Q	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	
Ans.																					

1- When do organisms use fermentation?

- a) When there is too much oxygen available
- b) When there is too much carbon dioxide available
- c) When there is too little carbon dioxide available
- d) When there is no oxygen available

2- The least yield of ATP is observed in

- (a) aerobic respiration
- (b) anaerobic respiration
- (c) fermentation
- (d) same in (a), (b), and (c)

3- In alcoholic fermentation, CO₂ is evolved during

- a. Decarboxylation of pyruvic acid
- b. Formation of acetaldehyde
- c. Oxidation of acetaldehyde
- d. Both a and b

4- In lactic acid fermentation, the final electron acceptor is:

- (a) Lactic acid
- (b) Pyruvate
- (c) Oxygen
- (d) NAD

- 5- Which type of fermentation occurs in muscle cells during strenuous exercise?**
 a. Ethanol b. Mixed acid c. Lactic acid d. Butyric acid
- 6- Glucose molecule during the process of glycolysis is broken down into**
 (a) Four pyruvic acid (b) Three pyruvic acid
 (c) Two pyruvic acid (d) One pyruvic acid
- 7- Which of these is not a product of fermentation?**
 (a) Lactate (b) Oxygen (c) Carbon dioxide (d) Ethanol
- 8- Complete oxidation of glucose in aerobic respiration can yield a net output of ...ATP.**
 a) 40 b) 6 c) 38 d) 2
- 9- Which of the following best describes how fermentation of pyruvate to lactic acid facilitates the production of ATP in the absence of oxygen?**
 a) It provides lactic acid, which can phosphorylate ADP via substrate-level phosphorylation
 b) It provides NADH for continued glycolysis
 c) It provides NAD⁺ for continued glycolysis
 d) It lowers the pH of the cytosol, increasing the efficiency of ATP synthase
- 10-Which of the following is the first step in Fermentation Technology?**
 a) Media Formulation b) Isolation of microbes
 c) Constructing of fermenter d) Preservation of microbes
- 11- Large vessel containing all the parts and condition necessary for the growth of desired microorganisms is called**
 a. Bio reactor b. Fermenter c. Impeller d. Both a and b
- 12- For thorough mixing of medium and inoculum the part of fermenter useful is and overheating of fermenter during fermentation is controlled by.....**
 a) Shaft - Cool air b) Headspace - Steam
 c) Impeller - Cooling jacket d) Sparger – Water spray
- 13- Cell density in is controlled by increasing and decreasing flow of culture medium.**
 a) Chemostat b) Turbidostat c) Continuous culture d) Synchronous culture
- 14- Mechanical foam breaker is generally preferred over antifoam agents.**
 a) True b) False
- 15- Which of the following traits would not be important for a microorganism used in industrial processes?**
 a) Fast growth b) Synthesize one or more products in high yield
 c) Be amenable to genetic manipulation d) Prokaryotic

16- Microbial population are maintained inphase of growth if secondary metabolites are required.

- a. Exponential b. Stationary c. Lag d. All of these

17- Saccharomyces cerevisiae produces high biomass yields at low glucose concentrations and high dissolved oxygen concentrations. Which of the following should be followed for maximizing its biomass productivity??

- a) Batch fermenter with a high initial glucose concentration
b) Continuous fermenter with a low initial glucose concentration
c) Fed batch fermenter
d) All of the above

18- A culture system with constant environmental conditions maintained through continual provision of nutrient and removal of wastes is called culture system.

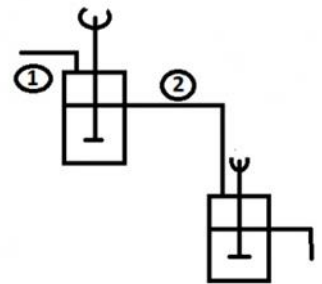
- a) continuous b)batch c) fed-batch d) semi continuous

19- A continuous bioreactor in which only the flow rate is used to control the rate of cell or product productivity is called

- a) turbidostat b) chemostat c) level stat d) pH meter

20-A multistage system is shown here. Label the stages 1 and 2.

- a) 1-Medium inlet and 2-culture effluent
b) 1-Mixing chamber and 2-culture effluent
c) 1-Medium inlet and 2-Liquid reservoir
d) 1-Culture effluent and 1-Medium Inlet



21-What are the disadvantages of continuous culture?

- a) It can rarely be used for other productions
b) The growth rate is higher
c) If contamination occurs, huge volumes of the product may be lost
d) It is very useful for processes involving the production of primary metabolites

22-The continuous culture or fermentation can be used to produce

- a) Biomass b) Primary metabolites
c) Secondary metabolites d) Antibodies

23- Which of the following provides the fewest problems while downstream processing?

- a) Natural media b) defined media
c) Complex media d) Semi-synthetic media

24- Which of the following is responsible for the formation of foam?

- a) Natural media b) Synthetic media
c) Complex media d) Defined media

25- All the following are organic Nitrogen Sources of fermentation media EXCEPT

- a) linseed b) Soybean meal c) Pharmamedia d) Whey powder

26- Theare not the growth factors.

- a) Vitamin b) Amino acids c) Fatty acids d) Carbohydrates

27- Regarding Crude and defined media which statement is FALSE?

- a) Crude media is cheap but composition is variable
b) Crude media is used for high volume/low value products
c) Defined media is expensive but composition is known
d) Defined media is used for inexpensive low volume products

28- Which of the following is NOT a scale-up process?

- a) Laboratory to pilot-scale b) Pilot-scale to industrial-scale
c) Industrial to pilot-scale d) Laboratory to industrial-scale

29- Which of the following additives are required for a better yield of the desired product?

- a) Precursors b) Regulators c) Inhibitors d) Growth Factors

30-Starch is used as an inducer for production

- a) penicillin b) citric acid c) amylase d)none of these

31-Which of the following is a downstream process?

- a) Product recovery b) Screening
c) Media formulation d) Sterilization of media

32-Foam production is more in medium containingand..... is used as antifoam agent.

- a) Protein & oils b) amino acid & vitamins
c) glucose & fats d) carbohydrate & buffers

33-..... process used at all scales of operation to separate suspended particles from a liquid or gas, using a porous medium which retains the particles but allows the liquid and gas to pass.

- a) Filtration b) Precipitation c) Diffusion d) Adhesion

34- What is the pH required for the production of Baker's Yeast?

- a)1-2 b) 4-5 c) 7-8 d) 10-12

35-is the important vitamin used for the production of Baker's Yeast

- a) Riboflavin b) Thiamine c) Biotin d)None of these

36- The protein content which is extracted from mixed or pure cultures of yeasts, bacteria, algae, and fungi is called

- a) triple cell protein b) single cell protein
c) double cell protein d) tetra cell protein

37- Various substrates are used by different yeasts in continuous culture for SCP yields including:

- a) n-Alkanes b) Ethanol c) Glucose d) All of these

38- *Agaricus bisporus* is grown on :

- a) compost of straw and animal manure b) cereal straw only
c) animal manure only d) none of the above

39- Mushrooms are excellent source of

- a. vitamin b. carbohydrate c. protein d. minerals

40- The process of making beer is known as

- a) Mashing b) Brewing c) Malting d) Sparging

Question No. II:

(20 points; 1 hour)

Discuss briefly each of the followings:

1. Nature of animal cell used in tissue cultures, types of animal cell media and different cultivation systems.
2. Production of monoclonal antibodies (MCAs) and their medical and industrial applications. Why MCAs have higher specificity than polyclonal antibodies?
3. Plant cultivation systems, commonly used plant cell cultures, and their advantages and limitations. How could you regenerate plant cell culture to a whole plant?
4. Enumerate medical and industrial importance of shikonin and microalgae.
5. Time profiles of glucose, penicillin, biomass concentrations and dissolved oxygen during penicillin G fermentation. Explain its downstream process
6. Ergot alkaloids; types of their fermentation processes and organisms used.
7. Conditions for production of the traditional vaccines
8. Bacteriophages as therapeutic agents

Question No. III:

(20 points; 1 hour)

Briefly, discuss each of the following:

1. Bioremediation and environmental roles of microorganisms.
2. A- Approaches of isolation of microorganisms from the environment, namely, 'shotgun' and 'objective' approaches.
B- General characteristics of an industrial microorganism
3. A- One method of total bacterial cell number and/or biomass determination.
B- One method of viable bacterial cells counting.
4. 'Carbon catabolite repression' as a metabolic regulatory process.
5. A- Benefits of enzyme immobilization.
B- Advantages of expression of enzymes in species from *Bacillus*, *Aspergillus* and *Saccharomyces* genera, for commercial enzymes production.

Good luck