KATHMANDU UNIVERSITY
End Semester Examination
05- January 2024

Marks Scored:

Level : B.Tech.
Year : IV

Course : BIOT 401
Semester : I

Exam Roll No. :
Registration No.:

Time: 30 mins.

F. M. : 20
Date :

SECTION "A"
[20 Q × 0.5=10 marks]

Choose and mark [X] the most appropriate alternative from each set of choices.

1. Industrial Biotechnology is also known as
   [ ] White Biotechnology [ ] Green Biotechnology
   [ ] Red Biotechnology [ ] Blue Biotechnology

2. Isolation of industrial strain with the highest affinity for a substrate can be done by
   [ ] Batch culture [ ] Enrichment liquid culture
   [ ] Continuous culture [ ] Fed batch culture

3. The improvement in the yield of primary metabolites can be achieved by targeting
   [ ] The control of the terminal pathway
   [ ] The supply of precursors from central metabolism
   [ ] The supply of NADPH by the recycling of NADP
   [ ] All of the above

4. A natural biotin auxotroph strain of *C. glutamicum* under biotin excess condition will overproduce:
   [ ] Glutamine [ ] Lysin [ ] Lactic acid [ ] Citric acid

5. Inosine is produced from auxotrophic strains of the strain
   [ ] *B. subtilis* [ ] *C. glutamicum* [ ] *A. niger* [ ] *P. aeruginosa*

6. In general 25 to 70% of the total cost of the fermentation may be due to
   [ ] Carbohydrate source [ ] Protein source
   [ ] Vitamin source [ ] Mineral source

7. Which is not true about liquid enrichment culture?
   [ ] Frequently carried out in culture flask
   [ ] The selective force changes during culture
   [ ] Repeated subculture will favor the growth of undesired microbes.
   [ ] The time of subculture is critical

8. During citric acid production, the metal used as as an antagonist of the enzyme aconitase is
   [ ] Fe [ ] Cu [ ] Mg [ ] Mn

9. The vitamin that is present in large amount in cane molasses is
   [ ] Biotin [ ] Thiamine [ ] Folic acid [ ] Riboflavin

10. The organism used for the production of lactic acid is
[ ] *L. delbruckii* [ ] *L. lactis* [ ] *L. casei* [ ] L. *acidophilus*

11. During Sake production, the rice is cooled to _____°C for the preparation of moromi.
[ ] 10 °C [ ] 20 °C [ ] 30 °C [ ] 50 °C

12. During ethanol fermentation, higher pH values lead to the formation of
[ ] Lactic acid [ ] Methanol [ ] Glycerol [ ] Acetic acid

13. The process used for avoiding catabolite repression during substrate conversion is
[ ] Chemostat [ ] Plug flow [ ] Batch [ ] Fed batch

14. During isolation of industrial microbes, which of the following does not have selective advantage
[ ] Antibiotic [ ] Protease [ ] Organic acids [ ] Cellulase

15. Organisms involved in koji fermentation:
[ ] *A. niger* [ ] A. flavus [ ] A. oryzae [ ] A. clavatus

16. The metabolic pathway feedback control in which the first enzyme of the pathway is inhibited or repressed only when all end products are in excess is called
[ ] Multivalent feedback [ ] Cooperative feedback
[ ] Cumulative feedback [ ] Unbranched feedback

17. Typical elemental formula of industrial microbial cells is approximately
[ ] $C_5H_{14}O_2N$ [ ] $C_3H_4O_2N$ [ ] $C_4H_7O_2N$ [ ] $C_6H_7O_2N$

18. All are the condition for glutamate over production, except
[ ] Biotin limitation [ ] Penicillin addition
[ ] Tween 80 addition [ ] Ethanol addition

19. Addition of sulfite in wine is done at a final concentration of
[ ] 10 ppm [ ] 25 ppm [ ] 75 ppm [ ] 150 ppm

20. The first successful application of genetic engineering techniques to the production of amino acids was obtained in the production of
[ ] Threonine [ ] Lysin [ ] Arginine [ ] Tryptophan

SECTION "B"

[10 Q. × 1=10 marks]

Fill in the blanks.

21. _____ is the technique resulting in increase of desired microorganism over undesired microbes.

22. The techniques used to overcome recombination barrier is _____ _____.

23. Sulfite liquors from deciduous contain mainly _____ sugars.

24. With respect to its carbon content, _____ is the cheapest fermentation substrate.

25. The insoluble metal phosphates in industrial media may be eliminated by incorporating low concentrations of _____agents.

26. The _____ reaction is one of the main causes of damage to culture media during heat sterilization.

27. The addition of corn-steep liquor increased the yield of _____.

28. The manipulation to standardize must is called _____.

29. The seed mash produced during sake production is called _____ _____.

30. During soya sauce fermentation the optimum temperature for protease production is _____.

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SECTION "C"
[3Q. × 8 = 24 marks]

Attempt *ANY THREE* questions.

1. Explain the various steps involved in the production of wine.
2. Explain the permeability hypothesis for the overproduction of glutamate by *Corynebacterium glutamicum.*
3. Explain the different steps involved in tempeh production.
4. What are the criteria of choice of industrial strain? What are the different techniques for the preservation of industrial strains.
5. Explain the steps involved in Sake fermentation.

SECTION "D"

Attempt *ANY SIX* questions. **(Question No. 5 is compulsory)**

6. Write short notes on [3+3=6]
   a. Enzyme inhibition assay
   b. Minimum mutation strain
7. Explain Protoplast fusion technique for industrial strain improvement. [5]
8. Explain the biochemical basis for the production of citric acid. [5]
9. Explain the steps in the traditional process of production of chyang/jand in Nepal. [5]
10. List the steps involved in Shoyu fermentation [5]
11. Explain why strain Improvement is necessary for Bioprocess Industries. Draw a flowchart for the process of industrial strain improvement? [5]
12. Explain the nature of auxotrophic mutant of C. glutamicum for lysin production? [5]
13. Explain how analogue resistant mutants overproduce products that control their own synthesis independently. [5]