**Roll No. .....**

| Question Booklet Number |
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**O. M. R. Serial No.**

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# M. Sc. (Microbiology) (Fourth Semester)

# EXAMINATION, July, 2022

## INDUSTRIAL MICROBIOLOGY

| Paper Code | | | | |
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| Questions Booklet Series |
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*Time : 1:30 Hours* ] [ *Maximum Marks : 100*

**Instructions to the Examinee :**

1. Do not open the booklet unless you are asked to do so.
2. The booklet contains 60 questions. Examinee is required to answer any 50 questions in the OMR Answer-Sheet provided and not in the question booklet. If more than 50 questions are attempted by student, then the first attempted 50 questions will be considered for evaluation. All questions carry equal marks.
3. Examine the Booklet and the OMR Answer-Sheet very carefully before you proceed. Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be got immediately replaced.

परीक्षार्थियों के लिए निर्देश :

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।
2. प्रश्न-पुस्तिका में 60 प्रश्न हैं। परीक्षार्थी को किन्हीं 50 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। यदि छात्र द्वारा 50 से अधिक प्रश्नों को हल किया जाता है तो प्रारम्भिक हल किये हुए 50 उत्तरों को ही मूल्यांकन हेतु सम्मिलित किया जाएगा। सभी प्रश्नों के अंक समान हैं।
3. प्रश्नों के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR आन्सर-शीट को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमें कुछ भाग छपने से छूट गए हों या प्रश्न एक से अधिक बार छप गए हों या उसमें किसी अन्य प्रकार की कमी हो, तो उसे तुरन्त बदल लें।

**(Remaining instructions on the last page)** (शेष निर्देश अन्तिम पृष्ठ पर)

***(Only for Rough Work)***

1. Which of the following is not a type of mutation ?

(A) Point mutations

(B) Frameshift mutations

(C) Sense mutation

(D) Missense mutations

2. The levels of primary metabolites are regulated by :

(A) Feedback mechanism

(B) rDNA Technology

(C) Incubating the microorganism in dark

(D) Adding the inhibitors

3. Which of the following is not a criterion to create a media ?

(A) It should be able to produce the maximum yield of product.

(B) It should be able to produce the maximum concentration of product.

(C) It should be easily sterilized.

(D) It should permit the maximum rate of product formation, no matter how costly it is.

4. Insulin in pro-hormone form contains an extra stretch is called :

(A) B-peptide

(B) G-peptide

(C) C-peptide

(D) S-peptide

5. 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

6. Which media component is not used for large scale production of fermentation product ?

(A) Carbon source

(B) Nitrogen source

(C) Phosphorus source

(D) Agar-agar

7. Which of the following is not a carbon source ?

(A) Blackstrap molasses

(B) Corn molasses

(C) Yeast extract

(D) Beet molasses

8. What are the key components of industrial hygiene ?

(A) Chemical and physical agents

(B) Biological and chemical agents

(C) Ergonomics and Psychological factors

(D) All of the above

9. The long exposure of batch sterilization may lead to :

(A) Purification of media

(B) Recovery of media

(C) Degradation

(D) Good quality of product

10. Which of the following species is used for producing Streptomycin ?

(A) *S. ramosus*

(B) *S. griseus*

(C) *S. aureofaciens*

(D) *S. griseoflavus*

11. Proper strain used in industry are known as :

(A) genetically regarded as safe (GRAS)

(B) genetically stable

(C) Non-toxic

(D) None of the above

12. For the recovery of citric acid after fermentation, $Ca(OH)_2$ is added to the slurry to :

(A) Precipitate calcium carbonate

(B) Precipitate calcium citrate

(C) Precipitate calcium phosphate

(D) Precipitate calcium sulphate

13. The substrate used by microorganisms to produce single-cell proteins includes :

(A) Methane gas

(B) Industrial wastes

(C) Agricultural wastes

(D) All of the above

14. What does not represent point mutation ?

(A) Frameshift mutation

(B) Transition

(C) Transversion

(D) Transposition

15. In *Penicillium chrysogenum*, the maximum antibiotic production occurs during the :

(A) The second phase

(B) The third phase

(C) First phase

(D) In all three phases

16. The efficiency of cell disruption in a bead mill depends on the :

(A) Concentration of the cells

(B) Amount and size of beads

(C) Type and rotational speed of agitation

(D) All of the above

17. Which of the following is not the use of baffles ?

(A) Increase the effect of agitation

(B) Improve the fermenter capacity

(C) Improve aeration efficiency

(D) Improve cooling capacity

18. Term ATCC stands for :

(A) Aerobic Type Culture Collection

(B) Anaerobic Type Culture Collection

(C) American Type Culture Collection

(D) None of the above

19. Which of the following is not an example of malt adjuncts ?

(A) Wheat

(B) Maize

(C) Rice

(D) Water

20. Which method is not the example of microbial preservation method based on dehydration ?

(A) Lyophilisation

(B) Liquid Nitrogen freezing

(C) Drying on silica gel

(D) L-drying

21. Which of the following is not a rule while doing scale-up studies ?

(A) The similarity in the geometry of the fermenter used.

(B) The similarity in the configuration of the fermenter used.

(C) There should a minimum of three or four stages of increment.

(D) Increasing power is a jump in scale.

22. Spirit vinegar is produced from :

(A) Fruit juices

(B) Malted grain

(C) Ethanol

(D) Ale

23. Which of the following reactions occurs during the sterilization which results in browning of media ?

(A) Sandmeyer reaction

(B) Maillard reaction

(C) Cannizzaro reaction

(D) Gattermann reaction

24. Which of the following is not a type of laboratory scale fermenter ?

(A) Mini fermenter

(B) Tower-fermenter

(C) Stirred fermenter

(D) Tall tubes

25. Which of the following organisms is not used for the production of citric acid ?

(A) *Aspergillus wentii*

(B) *Bacillus licheniformis*

(C) *Candida oleophila*

(D) *Saccharomyces cerevisiae*

26. Subunit vaccine is all, except :

(A) A whole purified virus

(B) A purified part or pieces of the antigen

(C) An expensive type of vaccine

(D) A Hepatitis-B vaccine

27. Which type(s) of ring is/are present in the Penicillin ?

(A) Pyrolle ring

(B) Imidazol ring and thiazolidine ring

(C) β-lactam ring and thiazolidine ring

(D) β-lactam ring and pyrolle ring

28. Scale down of fermentation required for :

(A) need to investigate changes observed or that require introduction at the large scale

(B) removes economic, strategic or environmental constraints of process investigations

(C) troubleshooting or trying to optimize the industrial scale fermentation

(D) All of the above

29. What is wine making process called ?

(A) Winification

(B) Vinification

(C) Distillation

(D) Fermentation

30. What is the basic function of the fermenter ?

(A) To sterilize the medium

(B) To recover the product

(C) To provide optimum growth conditions to organisms and obtain the desired product

(D) To purify the product

31. The boiling of grains during the mash step leads to :

(A) Saccharification

(B) Mashing

(C) Decoction

(D) Malting

32. Priming effect of small quantity of interferon on production can be seen in the form of :

(A) shorten the lag period between addition of inducer and the appearance of interferon

(B) increase in cells sensitivity to viral genome toxicity

(C) Both (A) and (B)

(D) Only (A)

33. Which of the following is not the component of aeration and agitation system ?

(A) Impeller

(B) Jacket

(C) Sparger

(D) Baffles

34. The head space of fermenter left unfilled with medium to allow for :

(A) Aeration

(B) Foaming

(C) None of the above

(D) Both (A) and (B)

35. Which of the following is not the objective of impeller used in fermenters ?

(A) Air dispersion

(B) Heat transfer

(C) Oxygen transfer

(D) Introduces air in media

36. Foam in fermenters can be controlled using :

(A) Silicones

(B) Lard oil

(C) Both (A) and (B)

(D) Only (B)

37. Dual fermentation for L-lysine involves strains defective for :

(A) DAP decarboxylase

(B) Aspartokinase

(C) Homoserine dehydrogenase

(D) None of the above

38. Algal pigments are produced at industrial level using which fermenter ?

(A) Stirred tank fermenter

(B) Photobioreactors

(C) Air lift bioreactor

(D) Bubble column bioreactor

39. What is a important point of consideration for working with fluidized bed reactor ?

(A) Gas dispersion

(B) Weight of the solid particles

(C) Medium pH

(D) Temperature

40. Which of the following components is present in the higher amount in the medium for amylase production by submerged fermentation ?

(A) KCl

(B) Corn starch

(C) $CaCl_2$

(D) Corn steep liquor

41. Which of the following instrument works on the principle of batch sterilization ?

(A) Incubator

(B) Autoclave

(C) Centrifuge

(D) Laminar Air Flow

42. Heat labile constituents of media are sterilize through :

(A) Filtration

(B) Chemical disinfectant

(C) UV light

(D) $\gamma$-radiation

43. Which of the following is not the physical method for the cells rupturing ?

(A) Impengment

(B) Homogenization

(C) Ultrasonication

(D) Enzymatic digestion

44. Downstream processing of fermentation includes in :

(A) Recovery of the products in a pure state

(B) Effluent treatment

(C) Both (A) and (B)

(D) None of the above

45. The effectiveness of a solvent can be measured by the :

(A) Distribution coefficients

(B) Selectivity

(C) Both (A) and (B)

(D) Diffusivity

46. Select the characteristic of industrially important microorganisms :

(A) Genetically stable

(B) Pure and free from phage

(C) Should produce a single valuable product

(D) All of the above

47. Which substrate is used for the isolation of protease-producing microbes ?

(A) Wheat bran

(B) Rice bran

(C) Paddy straw

(D) All of the above

48. Which of the following procedures is most advanced method for in strain improvement ?

(A) rDNA Technology

(B) Conjugation

(C) Transformation

(D) Transduction

49. Which of the following cannot induce mutations ?

(A) X-rays

(B) Gamma rays

(C) UV radiation

(D) Chlorine

50. Which of the following is a downstream process ?

(A) Product recovery

(B) Screening

(C) Media formulation

(D) Sterilization of media

51. Selection of sites for high yielding strains isolation is based on :

(A) Product to be produced

(B) Natural sources

(C) Both (A) and (B)

(D) Only (B)

52. What do you mean by 'scale-up' ?

(A) Decreasing the scale of fermentation

(B) Increasing the scale of fermentation

(C) Decreasing the rate of agitation

(D) Increasing the rate of fermentation

53. The screening method not used for industrial strains :

(A) Primary screening using dyes

(B) Use of defined media

(C) Chromatographic techniques

(D) Genetic engineering

54. Which of the following techniques is not used for isolation and screening of desired microorganisms ?

(A) Crowded plate technique

(B) Auxanographic technique

(C) Enrichment culture technique

(D) Hanging drop method

55. Which of the following is a class of polymers that are fully biodegradable ?

(A) Plastic

(B) Glass

(C) Thermacol

(D) Polyhydroxyalkanoates

56. What characteristics must be screened for selection of industrial strain ?

(A) Desirable property

(B) Strain stability

(C) Growth on cheap substrate material

(D) All of the above

57. Which of the following fermentation processes is used in the production of penicillin ?

(A) Aerobic fermentation followed by anaerobic fermentation

(B) Anaerobic fermentation

(C) Aerobic fermentation

(D) Anaerobic fermentation followed by aerobic fermentation

58. Which of the following shows zone of inhibition when a particular organism growth on petriplate ?

(A) Growth factor producer

(B) Antibiotic producer

(C) Organic acid producer

(D) Amino acid producer

59. Which of the following methods is not used for the improvement of bacterial strain ?

(A) The parasexual cycle

(B) Conjugation

(C) Transformation

(D) Transduction

60. 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

***(Only for Rough Work)***

4. Four alternative answers are mentioned for each question as—A, B, C & D in the booklet. The candidate has to choose the most correct/appropriate answer and mark the same in the OMR Answer-Sheet as per the direction :

**Example :**

**Question :**

Q. 1 (A) ● (C) (D)
Q. 2 (A) (B) ● (D)
Q. 3 (A) ● (C) (D)

Illegible answers with cutting and over-writing or half filled circle will be cancelled.

5. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.

6. All answers are to be given on OMR Answer sheet only. Answers given anywhere other than the place specified in the answer sheet will not be considered valid.

7. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.

8. After the completion of the examination candidates should leave the examination hall only after providing their OMR Answer Sheet to the invigilator. Candidate can carry their Question Booklet.

9. There will be no negative marking.

10. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.

11. To bring and use of log-book, calculator, pager and cellular phone in examination hall is prohibited.

12. In case of any difference found in English and Hindi version of the question, the English version of the question will be held authentic.

**Impt. :** On opening the question booklet, first check that all the pages of the question booklet are printed properly. If there is ny discrepancy in the question Booklet, then after showing it to the invigilator, get another question Booklet of the same series.

4. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर— A, B, C एवं D हैं। परीक्षार्थी को उन चारों विकल्पों में से एक सबसे सही अथवा सबसे उपयुक्त उत्तर छाँटना है। उत्तर को OMR आन्सर-शीट में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

उदाहरण :

प्रश्न :

प्रश्न 1 (A) ● (C) (D)
प्रश्न 2 (A) (B) ● (D)
प्रश्न 3 (A) ● (C) (D)

अपठनीय उत्तर या ऐसे उत्तर जिन्हें काटा या बदला गया है, या गोले में आधा भरकर दिया गया, उन्हें निरस्त कर दिया जाएगा।

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।

6. सभी उत्तर केवल ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर ही दिये जाने हैं। उत्तर-पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।

7. ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।

8. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी OMR Answer Sheet उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें। परीक्षार्थी अपने साथ प्रश्न-पुस्तिका ले जा सकते हैं।

9. निगेटिव मार्किंग नहीं है।

10. कोई भी रफ कार्य, प्रश्न-पुस्तिका के अन्त में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।

11. परीक्षा-कक्ष में लॉग-बुक, कैलकुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।

12. प्रश्न के हिन्दी एवं अंग्रेजी रूपान्तरण में भिन्नता होने की दशा में प्रश्न का अंग्रेजी रूपान्तरण ही मान्य होगा।

महत्वपूर्ण : प्रश्नपुस्तिका खोलने पर प्रथमतः जाँच कर देख लें कि प्रश्न-पुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्षनिरीक्षक को दिखाकर उसी सिरीज की दूसरी प्रश्न-पुस्तिका प्राप्त कर लें।