VERSION CODE

A1

Maximum Marks : 100
Total Duration : 150 Minutes
Maximum Time For Answering : 120 Minutes
Subject : **BIOTECHNOLOGY**

MENTION YOUR PGCET NUMBER

Serial Number : 101121

Subject Code **P-BT**

P-BT A1

DOs:

1. This question booklet is issued to you by the invigilator **after 02.20 pm.**
2. Check whether the PGCET Number has been entered and shaded in the respective circles on the OMR answer sheet.
3. The version code and serial number of this question booklet should be entered on the OMR answer sheet and the respective circles should also be shaded completely.
4. The Version Code and Serial Number of this question booklet should be entered on the Nominal Roll without any mistakes.
5. Compulsorily sign at the bottom portion of the OMR answer sheet in the space provided.

DON'Ts:

1. The timing and marks printed on the OMR answer sheet should not be damaged / mutilated / spoiled.
2. The 3rd Bell rings at 2.30 p.m., till then;
   - Do not remove the seal present on the right hand side of this question booklet.
   - Do not look inside this question booklet or start answering on the OMR answer sheet.

IMPORTANT INSTRUCTIONS TO CANDIDATES

1. In case of usage of signs and symbols in the questions, the regular textbook connotation should be considered unless stated otherwise.
2. This question booklet contains 75 questions and each question will have one statement and four different options / responses & out of which you have to choose one correct answer.
3. After the 3rd Bell is rung at 02.30 pm, remove the paper seal on the right hand side of this question booklet and check that this booklet does not have any unprinted or torn or missing pages or items etc., if so, get it replaced by a complete test booklet. Read each item and start answering on the OMR answer sheet.
4. Completely darken / shade the relevant circle with a **blue or black ink ballpoint pen** against the question number on the OMR answer sheet.

ಸರಿಯಾದ ಕ್ರಮ CORRECT METHOD				ತಪ್ಪು ಕ್ರಮಗಳು WRONG METHOD							
Ⓐ	⊗	Ⓒ	Ⓓ	⊗	Ⓑ	Ⓒ	Ⓓ	Ⓐ	⦿	⦿	Ⓓ
Ⓐ	●	Ⓒ	Ⓓ	⦿	Ⓑ	Ⓒ	Ⓓ	Ⓐ	●	Ⓒ	Ⓓ

5. Please note that even a minute unintended ink dot on the OMR answer sheet will also be recognized and recorded by the scanner. Therefore, avoid multiple markings of any kind on the OMR answer sheet.
6. Use the space provided on each page of the question booklet for Rough Work. Do not use the OMR answer sheet for the same.
7. **Last bell will ring at 4.30 pm, stop marking on the OMR answer sheet.**
8. Hand over the **OMR answer sheet** to the room invigilator as it is.
9. After separating the top sheet (KEA copy), the invigilator will return the bottom sheet replica (candidate's copy) to you to **carry home for self-evaluation.**
10. Only **Non-programmable** calculators are allowed for "M.E. / M.Tech / M.Arch." examination.

Marks Distribution	PART-1 : 50 QUESTIONS CARRY ONE MARK EACH (1 TO 50)
	PART-2: 25 QUESTIONS CARRY TWO MARKS EACH (51 TO 75)

BIOTECHNOLOGY

PART – 1

Each question carries one mark. (50 × 1 = 50)

1. Phage display technique utilizes _____ phage

   (A) T7

   (B) M13

   (C) λ-phage

   (D) φ6

2. Which among the bacterial genus contains in the cell membrane?

   (A) *Vibrio*

   (B) *Mycoplasma*

   (C) *Escherichia*

   (D) *Chlamydia*

3. Using the serologic diagnosis _____ will be identified.

   (A) Actinomycosis

   (B) Q-fever

   (C) Pulmonary tuberculosis

   (D) Gonorrhea

4. _____ among the following is not a recognised cause of diarrhoea

   (A) *Vibrio cholerae*

   (B) *Escherichia coli*

   (C) *Clostridium perfringens*

   (D) *Enterococcus faecalis*

5. Among the following bacterial components _____ is least likely to contain useful antigens

   (A) Cell wall

   (B) Flagella

   (C) Ribosomes

   (D) Capsule

6. Which of the following enzymes catalyse the hydrolytic cleavage of C-O, C-N, C-C bonds?

   (A) Hydrolases

   (B) Lyases

   (C) Ligases

   (D) Isomerases

Space For Rough Work

7. During the pre-steady state of an enzymatic reaction, concentration of _____ builds up

   (A) E

   (B) ES

   (C) P

   (D) None of the above

8. A _____ inhibitor binds only to the ES complex

   (A) Competitive

   (B) Non-competitive

   (C) Uncompetitive

   (D) None of the above

9. _____ mediates the body's response to longer term stresses

   (A) Insulin

   (B) Cortisol

   (C) Epinephrine

   (D) None of the above

10. During DNA cloning which of the following is not a crucial requirement?

    (A) DNA inserts

    (B) Vector

    (C) Protein expression

    (D) Molecular cutter

11. In a diploid organism with 30,000 bases haploid genome contains 23% A residues. What is the number of G residues in the genome of this organism?

    (A) 16000

    (B) 16200

    (C) 16500

    (D) 14200

12. Which of the following genetic code shows ambiguity?

    (A) CGU

    (B) AUG

    (C) GAC

    (D) UGA

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13. Which of the following process is an exception of Mendel Law?

    (A) Mutation

    (B) Variation

    (C) Cloning

    (D) Linkage

14. In which phase of microbial cell growth the following characteristic is observed. "Cell mass increases a little, while the cell number density remains almost constant"

    (A) Lag phase

    (B) Exponential growth phase

    (C) Stationary phase

    (D) Death phase

15. In diauxic growth multiple lag phases are observed, that may be observed when the medium contains

    (A) More than one oxygen source

    (B) More than one hydrogen source

    (C) More than one nitrogen source

    (D) More than one carbon source

16. If a plot of $\ln X$ (y axis) versus t (x axis) is plotted for a given data, the slope gives

    (A) Net spectific replication rate

    (B) Endogenious metabolism

    (C) Net specific growth rate

    (D) Gross specific growth rate

17. Water is an example of

    (A) Newtonian fluid

    (B) Pseudoplastic fluid

    (C) Dilatant fluid

    (D) Bingham plastic fluid

18. Which of the following is not correct for the Monod model and the Michaelis Menten Model?

    (A) The Michaelis-Menten Model was derived from a curve fitting exercise

    (B) The Michaelis Menten Model was derived from an analysis of the mechanism of microbial growth

    (C) The Monod Model was derived from an analysis of the mechanism of microbial growth

    (D) All of the above

Space For Rough Work

19. Why a T-flask used in small-scale cell culture is incubated in a horizontal position?

   (A) To save space

   (B) To increase the surface area of the liquid-air interface

   (C) Both (A) and (B)

   (D) To increase the rate of oxygen transfer into the liquid.

20. Yield coefficient represents

   (A) Total biomass or product produced

   (B) Conversion efficiency of a substrate into product

   (C) Conversion rate of a substrate into biomass or product

   (D) Production time of biomass or product

21. The lowest biomass yield in a culture of *Escherichia coli* will be in

   (A) an aerated batch culture containing an initial high concentration of glucose

   (B) an aerated batch reactor containing an initial low concentration of glucose

   (C) an aerated fed-batch reactor having a low glucose concentration

   (D) an aerated continuous reactor having a low glucose concentration

22. A flooded impeller will lead to poor oxygen transfer rates because

   (A) the cells clog up the surface of the bubble

   (B) bubbles tend to break down too rapidly under high shear conditions

   (C) bubbles tend to move too quickly through the bulk liquid

   (D) bubbles tend to coalesce under the impeller

23. Power number is ratio of

   (A) imposed force to inertial force

   (B) buoyant force to inertial force

   (C) gravitational force to inertial force

   (D) imposed force to gravitational force

24. Which of the following statements is FALSE?

   (A) Memory B cells constitutively secrete immunoglobulins

   (B) Long - lived plasma cells are mostly found in the spleen

   (C) Memory B cells usually have high affinity for antigen

   (D) Generation of long-lived B cell memory requires CD4 + T cell help

Space For Rough Work

25. Monoclonal antibodies recognize a single

    (A) Antigen

    (B) Bacterium

    (C) Epitope

    (D) B cell

26. Hormonal systems are commonly characterized by feedback inhibition. In contrast to hormones, many cytokines amplify responses by upregulation of their own receptors on target cells.

An example of this mechanism is seen in which of the following?

    (A) the differential cytokine expression of TH1 and TH2 cells

    (B) the chemokine concentration gradient resulting in chemotaxis

    (C) the stimulation of CD4+T cells by IL-2.

    (D) the effect of cytokines on osteoblastic differentiation

27. What is used as stop solution with ELISA substrate TMB?

    (A) Sodium Hydroxide

    (B) SSC

    (C) Sulphuric acid

    (D) EDTA

28. In indirect ELISA test, the order in which reagents are to be added is

1-enzyme-linked antibody

2-known antigen

3-patient serum 4-substrate

    (A) 3-2-1-4

    (B) 2-4-1-3

    (C) 2-3-1-4

    (D) 4-2-1-3

29. To move negatively charged molecules through matrix of agarose, nucleic acid molecules are separated by applying

    (A) electric current

    (B) electric field

    (C) magnetic field

    (D) UV radiations

30. Which of the following enzymes is used to cut DNA in rDNA tehnology?

    (A) Ligase

    (B) Phosphatase

    (C) Ribonuclease

    (D) Restriction enzymes

Space For Rough Work

31. _____ tool uses different pair-score matrices, biases the gap location and realign the aligned set of sequence to refine the alignments

(A) PSI BLAST

(B) CLUSTAL W

(C) BLAST

(D) FASTA

32. The most common method of sequence comparison is _____

(A) Sequence alignment

(B) Sequence formatting

(C) Sequence truncation

(D) Sequence profiling

33. Two genes share a common ancestry is _____

(A) Palaeontology

(B) Homology

(C) Oncology

(D) Orthology

34. In a 2D framework, the vertices represents the sequence residues and which is commonly seen in the dot plots. Meanwhile in the lattice, the edge that connects 2 vertices in a diagonal way corresponding to the pairing of one residue from each sequence. Pair of residue can be observed with horizontal and vertical edges in one sequence and nothing in the other. These edges constitute _____ in an alignment.

(A) Match

(B) Gap

(C) Mismatch

(D) Indels

35. To predict the functionality of the protein _____ alignment is essential than evolutionary alignment

(A) Pairwise

(B) Sequence

(C) Structural

(D) Multiple

36. Which of the following is the strategies for gene finding?

(A) Site based methods

(B) Site, content based and comparative methods

(C) Comparative methods

(D) Content based methods

Space For Rough Work

37. RAPD molecular markers are _____

    (A) Recessive

    (B) Codominant

    (C) Dominant

    (D) Neutral

38. The most commonly used plant transformation method is _____

    (A) Protoplast method

    (B) Agrobacterium mediated transformation

    (C) Microinjection

    (D) None of the above

39. A plant with 2n = 20 will have _____ linkage group

    (A) 10

    (B) 20

    (C) 40

    (D) 50

40. Which of the following microorganisms is commonly known as 'Pink Bread Mould'?

    (A) *Neurospora*

    (B) *Aspergillus*

    (C) *Mucor*

    (D) *Rhizopus*

41. Which is an anti-hemorrhagic vitamin?

    (A) Vitamin-A

    (B) Vitamin-K

    (C) Vitamin-E

    (D) Vitamin-C

42. The term pH stands for

    (A) Presence of Hydrogen

    (B) Positive Hydrogen

    (C) Potential of Hydrogen

    (D) Power of Hydrogen

Space For Rough Work

43. Mono-Sodium Glutamate is used as

   (A) Source of amino acid

   (B) Flavour enhancer

   (C) Binder

   (D) Moisture retainer

44. Name the process by which soil formation occurs

   (A) Erosion

   (B) Collision

   (C) Weathering

   (D) None of the above

45. Municipal solid waste is

   (A) Toxic

   (B) Hazardous

   (C) Non-toxic

   (D) Non-hazardous

46. The xenobiotics can be referred as _____

   (A) Hazardous

   (B) Non toxic

   (C) Prodrugs

   (D) None of the above

47. In a graphical representation _____ variable must be in X axis

   (A) Dependent

   (B) Independent

   (C) Grouping

   (D) None of the above

48. The time that depends on the input: an already sorted sequence that is easier to sort.

   (A) Process

   (B) Evaluation

   (C) Running

   (D) Input

49. In C, what are the various types of real data type?

   (A) Float, long double

   (B) Long double, short int

   (C) Float, double, long double

   (D) Short int, double, long int, float

50. When an algorithm is written in the form of a programming language, it becomes a _____

   (A) Flowchart

   (B) Program

   (C) Pseudo code

   (D) Syntax

Space For Rough Work

PART – 2

Each question carries 2 marks.   (25 × 2 = 50)

51. The coagulase is done to differentiate

    (A) *Staphylococcus aureus from Staphylococcus epidermids*

    (B) *Staphylococcus epidermidis from Neisseria meningitidis*

    (C) *Streptococcus pyogenes from Enterococcus faecalis*

    (D) *Streptococcus pyogenes from Staphylococcus aureus*

52. The non-covalent associations between neutral molecules are collectively known as

    (A) Hydrophobic interaction

    (B) Ionic interactions

    (C) Hydrogen bonding interaction

    (D) Van der Waals forces

53. Kozak sequence in Eukaryotes contains

    (A) 5' uccgccRccAUGG 3'

    (B) 5' cccgccRccAUGG 3'

    (C) 5' gccgccRccAUGG 3'

    (D) 5' accgccRccAUGG 3'

54. With respect to Histone H1 DNA packaging which of the following is false?

    (A) H1 induces 10 nm fibre formation

    (B) H1 binding gives nucleosome a defined angle

    (C) H1 stabilizes higher order chromatin structures

    (D) H1 binds to two DNA helices at once

55. Which blood groups are codominant?

    (A) I^A and I^O

    (B) I^B and I^O

    (C) I^A and I^B

    (D) I^B and I^B

56. 1 mole of biological material containing (carbon, hydrogen, oxygen and nitrogen in molecular formula) is defined as

    (A) The amount of material containing 1 g atom of carbon

    (B) The amount of material containing 1 g atom of nitrogen

    (C) The amount of material containing 1 g atom of hydrogen

    (D) The amount of material containing 1 g atom of oxygen

Space For Rough Work

57. A distillation column separates 10,000 kg/h of benzene-toluene mixture. Let xF, xD, xW represent weight fraction of benzene in feed, distillate and residue respectively. If the values of xF, xD, xW are 0.5, 0.95 and 0.05 respectively, then the reflux ratio is

(A) 0.5

(B) 0.6

(C) 0.55

(D) 2.0

58. The function of the disengagement zone in an airlift fermenter is to

(A) Prevent CO_2 rich bubbles from entering the down comer

(B) Reduce the velocity of the bubbles

(C) Reduce liquid loss as aerosols

(D) All of the above

59. Stationary phase is described as

(A) No further increase in the cell population after a maximum value+

(B) Deceleration of growth and division rate after the growth rate reaches a maximum

(C) Acceleration of growth and division rate after the growth rate reaches a maximum

(D) Deceleration of growth and division rate after the growth rate reaches a minimum

60. A mixed fermentation is one, which produces

(A) both alcohol and carbon dioxide

(B) both acid and carbon dioxide

(C) both acid and alcohol

(D) several different kinds of acid

61. The volume of liquid (V_L) in a cylindrical reactor can be calculated from the liquid height (H_L) and tank diameter (D_t) using the following equation

(A) $V_L = 4/3 \times \pi \times H_L \times D_t^3/8$

(B) $V_L = H_L \times \pi \times D_t^2/4$

(C) $V_L = H_L \times \pi \times D_t^2$

(D) $V_L = 4 \times \pi \times D_t^2$

62. Power consumption by agitation is

(A) A function of physical properties

(B) A function of operating conditions

(C) A function of vessel and impeller geometry

(D) All of the above

Space For Rough Work

63. Vortexing in stirred tank reactors can be prevented by

    (A) Installing baffles in the reactor

    (B) Shifting the impeller to an off - centre position

    (C) Both (A) and (B)

    (D) Using axial flow impellers

64. The major role of the complement system is to work in conjunction with

    (A) antibodies to lyse cells via the C8 and C9 components

    (B) antibodies to lyse cells via the perforin molecules

    (C) antibodies to opsonize cells

    (D) the major histocompatibility complex for cell recognition

65. What causes hook effect in ELISA assays?

    (A) Antibody specificity

    (B) High levels of antigen in the sample

    (C) High levels of antibody in the reaction

    (D) Low levels of antigen

66. The human major histocompatibility complex

    (A) Encodes the Human Leukocyte Antigens (HLA) expressed only on leukocytes.

    (B) Is not expressed as codominant antigens on the cell suface.

    (C) Provokes the most intense allograft reactions.

    (D) Contains only class I and class II genes.

67. Which one of the following statements is false? Rejection of a second (set) skin graft from the same allogeneic donor

    (A) Can be blocked by azathioprine (an antimitotic agent).

    (B) Proceeds at the same speed as the first graft rejection

    (C) Shows specificity for the graft donor

    (D) Can be transferred to a naive recipient with lymphocytes

68. Choose the incorrect statement for the preparation of genomic libraries.

    (A) The first step is the isolation of genomic DNA

    (B) Physical damage to the DNA should be avoided

    (C) If a nuclear DNA library is to be constructed, organelle DNA is to be removed

    (D) For the construction of organelle library, oganelle DNA is purified from the nuclear DNA

Space For Rough Work

69. In a multiple sequence alignment, the assessment of the aligned sequence can be done using _____

 (A) Randomization

 (B) Monte Carlo test of significance

 (C) Both randomization and Monte Carlo

 (D) Chi-square distribution

70. A plant with genotype *Gg Ww* will produce _____ gametes

 (A) GG, WW, gg, ww

 (B) Gw, GG, GW

 (C) GW, gw, gW, Gw

 (D) All of the above

71. If a product is said to be "Sugar Free" it contains how much sugar?

 (A) Not more than 40 kcal per serving

 (B) Less than 0.5 grams of sugar per serving

 (C) Less than 10.0 grams

 (D) None of the above

72. Autotrophic and heterotrophic organisms are

 (A) Self-nourishing and dependents respectively.

 (B) Runs on self production and produces its own food

 (C) Depends on the other organisms to produce the food

 (D) None of the above

73. The order of waste management hierarchy, from most to least favoured

 (A) Prevention-Recycle-Reuse-Disposal

 (B) Prevention-Reuse-Disposal-Recycle

 (C) Prevention-Reuse-Recycle-Disposal

 (D) Prevention-Disposal-Reuse-Recycle

74. Calculate the arithmetic average for the following data: 15, 12, 18, 15, 14, 13, 20, 18

 (A) 18.25

 (B) 15.625

 (C) 20.155

 (D) 17.25

Space For Rough Work

75. The difference between variable declaration and variable definition is

(A) Declaration and definition are the same. There is no difference.

(B) A declaration is used for variables and definitions is used for functions.

(C) Declaration associates type to the variable whereas definition associates scope to the variable.

(D) Declaration associates type to the variable whereas definition gives the value to the variable.

_____

A1