No. of Pages. 20

Code No.	Y – 3040

Register Number :

Name :

Time : 2 Hours

Max.Marks : 100

Entrance Examination for Admission to the P.G. Courses in the Teaching Departments, 2026

CSS

BIOTECHNOLOGY

GENERAL INSTRUCTIONS

1. The Question Paper is having 100 Objective Questions, each carrying one mark.
2. The answers are to be marked **only** in the "**OMR Sheet**" provided.
3. **Negative marking** : **0.25 marks** will be deducted for each wrong answer .

INSTRUCTIONS FOR FILLING THE OMR SHEET

- The OMR sheet should not be folded or crushed.
- Use only blue/black ball point pen to fill the circles.
- Use of pencil is strictly prohibited.
- Circles should be darkened completely and properly.
- Cutting and erasing on this sheet is not allowed.
- Do not leave any stray marks on the sheet.
- Do not use marker or white fluid to hide the mark.
- WRONG METHODS

CORRECT METHOD

DO NOT WRITE HERE

Choose appropriate answer from the options in the questions.

(100 × 1 = 100 marks)

1. Which of the following best describes Red Biotechnology?
   A. Environmental clean-up
   B. Agricultural production
   C. Medical and pharmaceutical processes
   D. Marine food resources

2. Selectable markers are used in cloning to
   A. Identify transformed cells
   B. Cut DNA at specific sites
   C. Ligate DNA fragments
   D. Enhance DNA replication

3. Ability of a single plant cell to divide and produce all the differentiated cells in an organism is known as:

A. Cloning
B. Totipotency
C. Differentiation
D. Hybridization

4. For transformation, microparticles coated with DNA to be bombarded with gene gun are made up of

A. Gold or Tungsten
B. Silicon or Platinum
C. Platinum or Zinc
D. Silver or Platinum

5. Klenow fragment is derived from

A. DNA Ligase
B. DNA Pol-I
C. DNA Pol-II
D. Reverse Transcriptase

6. Genetically modified "Golden Rice" is rich in

A. β-carotene
B. Vitamin C
C. Ferritin
D. Biotin

7. First successfully cloned animal was

A. Monkey
B. Gibbon
C. Sheep
D. Rabbit

8. Second law of thermodynamics states that:

A. Energy flows spontaneously from low temperature to high temperature
B. Total entropy of an isolated system always increases over time
C. All energy is converted into work without loss
D. Living systems violate the second law

9. Technique that uses scattering to reveal an unknown protein structure is

A. X ray crystallography
B. NMR
C. Fluorescence spectrophotometry
D. CD spectrophotometry

10. Which of the following is an example of diffusion?
    A. Water moving up a tree
    B. Smell of perfume spreading in a room
    C. Blood pumping through veins
    D. Melting of ice into water

11. Paper chromatography separates molecules based on which property?
    A. Polarity
    B. Molecular weight
    C. Shape
    D. Viscosity

12. Gel filtration matrix most appropriate for separating proteins with molecular masses of 30 kDa, 50 kDa and 80 kDa is
    A. Sephadex G-50
    B. Sephadex G-100
    C. Sephadex G-10
    D. Sephadex G-25

13. Unit of molar extinction coefficient (ε) is:
    A. mol L^{-1}
    B. $L\,mol^{-1}cm^{-1}$
    C. cm^2
    D. mol cm^{-1}

14. If transmittance of a solution is 50%, what is its absorbance?
    A. 0.25
    B. 0.60
    C. 1.00
    D. 0.30

15. Main interaction during the spontaneous formation of the lipid bilayer is
    A. Covalent bonding
    B. Hydrogen bonding
    C. Hydrophobic effect
    D. Ionic interactions

16. Amino acid known as a "helix breaker" which has unique allowed regions in the Ramachandran plot is
    A. Alanine
    B. Glycine
    C. Proline
    D. Leucine

17. In SDS-PAGE, SDS primarily functions to

A. Break peptide bonds

B. Provide uniform negative charge to proteins

C. Increase molecular weight

D. Neutralize proteins

18. Most radiosensitive phase of the cell cycle is

A. G_0 phase

B. G_1 phase

C. S phase

D. M phase

19. The LD50/30 in humans refers to:

A. Lethal dose causing 50% death in 30 hours

B. Lethal dose causing 50% death in 30 days

C. Lethal dose causing 50% death in 30 minutes

D. Dose causing 30% mutation rate

20. In agarose gel electrophoresis, DNA migrates toward the

A. Cathode

B. Anode

C. Neutral electrode

D. Positive buffer front

21. When the temperature of a gas is increased, the rate of diffusion

A. Increases

B. Decreases

C. Remains constant

D. Fluctuates

22. High specific heat of water is due to

A. lonic bonding

B. Hydrogen bonding

C. Covalent bonding

D. Peptide bonding

23. Primary buffer system in human blood is

A. Phosphate buffer

B. Bicarbonate buffer

C. Acetate buffer

D. Citrate buffer

24. Glucose is classified as a

A. Ketohexose
B. Aldohexose
C. Aldopentose
D. Ketopentose

25. Cellulose is composed of glucose units linked by

A. $\alpha(1 \rightarrow 4)$ bonds
B. $\alpha(1 \rightarrow 6)$ bonds
C. $\beta(1 \rightarrow 4)$ bonds
D. $\beta(1 \rightarrow 6)$ bonds

26. Sucrose is a non-reducing sugar because

A. It contains no glucose
B. It lacks a glycosidic bond
C. Both anomeric carbons are involved in glycosidic linkage
D. It cannot dissolve in water

27. Net gain of ATP molecules per glucose molecule during glycolysis is

A. 1
B. 2
C. 4
D. 6

28. ATP synthesis during oxidative phosphorylation is driven by

A. Substrate-level phosphorylation
B. Proton gradient
C. Direct oxygen binding
D. Carbon dioxide release

29. Fluid mosaic model of the cell membrane was proposed by

A. Watson and Crick
B. Singer and Nicolson
C. Schleiden and Schwann
D. Hooke

30. The coding strand of DNA is also known as the

A. Template strand
B. Antisense strand
C. Sense strand
D. Lagging strand

31. Okazaki fragments are formed during replication of the

A. Leading strand
B. Lagging strand
C. Template strand
D. RNA strand

32. The sodium-potassium pump transports

A. $2\ Na^+$ out and $3K^+$ in

B. $3Na^+$ out and $2K^+$ in

C. $3\ Na^+$ in and $2K^+$ out

D. Equal amounts of Na^+ and K^+

33. Enzymes for β-oxidation are primarily located in animal cells in

A. Cytosol

B. Endoplasmic reticulum

C. Mitochondrial matrix

D. Lysosomes

34. Rate-limiting enzyme in fatty acid synthesis is

A. Fatty acid synthase

B. Acetyl CoA carboxylase

C. Carnitine acyltransferase

D. Malonyl CoA decarboxylase

35. Molecule that tags proteins for degradation by the proteasome is

A. Ubiquitin

B. Chaperonin

C. Calmodulin

D. Cyclin

36. Which of the following is an essential fatty acid?

A. Palmitic acid

B. Stearic acid

C. Linoleic acid

D. Oleic acid

37. A260/A280 ratio of ~ 1.8 generally indicates

A. Protein contamination

B. Pure DNA

C. RNA contamination

D. Phenol contamination

38. Biuret method detects proteins by reacting with

A. Aromatic amino acids

B. Peptide bonds

C. Phosphate groups

D. Disulfide bonds

39. RNA is more susceptible to degradation mainly due to

A. Absence of nitrogen bases

B. Presence of 2'–OH group

C. Double-stranded structure

D. Lack of phosphate group

40. The "musty odor" of soil is caused by a compound produced by Actinomycetes known as

A. Petrichor
B. Humic acid
C. Geosmin
D. 2-Methylisoborneol

41. Function of immersion oil in microscopy is to

A. Clean the slide
B. Increase contrast
C. Increase resolution by reducing light refraction
D. Fix the specimen

42. One of the following is not a Koch's postulates

A. Microorganism must be found in diseased hosts
B. Microorganism must be isolated and grown in pure culture
C. Disease must be hereditary
D. The cultured microorganism should cause disease in a healthy host

43. Swan-neck flask experiment disproved the theory of

A. Germ theory
B. Biogenesis
C. Spontaneous generation
D. Fermentation

44. In Hfr conjugation, transfer of chromosomal genes

A. Occurs randomly without order
B. Begins at a fixed origin and follows a linear sequence
C. Transfers the entire chromosome always
D. Does not require recombination

45. Key difference between generalized and specialized transduction is that specialized transduction

A. Transfers random genes
B. Requires conjugation
C. Transfers only genes adjacent to prophage integration site
D. Occurs without phage

46. Catabolite repression in the lac operon is mediated by

A. RNA polymerase only
B. CAP-cAMP complex
C. Repressor protein only
D. Ribosomes

47. Cholera toxin primarily causes

A. Cell lysis
B. Increased cAMP leading to water loss
C. DNA damage
D. Immune suppression

48. Target of β-lactam antibiotics is

A. 50S ribosomal subunit
B. DNA gyrase
C. Penicillin-binding proteins (PBPs)
D. RNA polymerase

49. Horizontal gene transfer contributes to antibiotic resistance through

A. Mutation only
B. Conjugation, transformation, transduction
C. Binary fission
D. Sporulation

50. Efflux pump-mediated resistance results in

A. Increased drug activation
B. Reduced drug entry
C. Active expulsion of antibiotic from cell
D. Enzymatic drug degradation

51. 16S rRNA gene sequencing is commonly used for

A. Protein quantification
B. Identification and classification of bacteria
C. Measuring metabolic rate
D. Antibiotic susceptibility testing

52. Bioaugmentation refers to
    A. Enhancing indigenous microbes with nutrients
    B. Adding specific microbial strains to contaminated sites
    C. Increasing oxygen levels only
    D. Removing heavy metals physically

53. Heterocysts in cyanobacteria are specialized for
    A. Reproduction
    B. Nitrogen fixation
    C. Photosynthesis
    D. Spore formation

54. Reserve food material in diatoms is
    A. Starch
    B. Glycogen
    C. Chrysolaminarin
    D. Floridean starch

55. Red color of Rhodophyta is mainly due to
    A. Fucoxanthin
    B. Phycoerythrin
    C. Chlorophyll b
    D. Carotene

56. Sequence of primary succession on rock typically begins with
    A. Trees
    B. Grasses
    C. Lichens
    D. Shrubs

57. Wilting in plants is primarily associated with
    A. Excess chlorophyll
    B. Loss of turgor pressure
    C. Increased cell division
    D. Thickening of cell wall

58. The disease triangle concept consists of
    A. Host, pathogen, environment
    B. Host, vector, soil
    C. Pathogen, vector, climate
    D. Soil, water, nutrients

59. Roguing is the practice of
    A. Chemical spraying
    B. Removing and destroying diseased plants
    C. Soil sterilization
    D. Seed coating

60. International plant quarantine regulations are governed under
    A. WHO
    B. FAO-IPPC
    C. WTO only
    D. UNEP

61. Dominant phase in pteridophytes is
    A. Gametophyte
    B. Sporophyte
    C. Protonema
    D. Archegonium

62. "Age of Gymnosperms" refers to the
    A. Paleozoic era
    B. Mesozoic era
    C. Cenozoic era
    D. Precambrian era

63. In dicot stems, vascular bundles are generally
    A. Scattered
    B. Radial
    C. Arranged in a ring
    D. Absent

64. Cleistogamous flowers ensure
    A. Cross-pollination
    B. Self-pollination
    C. No pollination
    D. Wind pollination

65. The Casparian strip is present in
    A. Epidermis
    B. Cortex
    C. Endodermis
    D. Pith

66. Casing in mushroom cultivation refers to
    A. Packing mushrooms
    B. Covering compost with a layer of soil
    C. Sterilizing tools
    D. Drying spawn

67. Genetic drift is more significant in
    A. Large populations
    B. Small populations
    C. Stable populations
    D. Migrating populations

68. Hardy-Weinberg equilibrium applies when

A. Selection is strong

B. Mutation rate is high

C. Population is large with no evolutionary forces

D. Migration is frequent

69. Cnidarians possess specialized stinging cells called

A. Choanocytes

B. Nematocysts

C. Flame cells

D. Nephridia

70. Echinodermata and Chordata are grouped together because they are

A. Acoelomates

B. Protostomes

C. Deuterostomes

D. Pseudocoelomates

71. Heart of fishes is

A. Two-chambered

B. Three-chambered

C. Four-chambered

D. Single-chambered

72. Cyclostomes are characterized by

A. Paired fins

B. Jaws

C. Circular mouth without jaws

D. Operculum

73. Pacemaker of the heart is

A. AV node

B. SA node

C. Bundle of His

D. Purkinje fibers

74. Bohr effect refers to

A. Increased O_2 affinity at low CO_2

B. Decreased O_2 affinity at high CO_2 and low pH

C. Increased CO_2 binding to hemoglobin

D. Oxygen binding to myoglobin

75. Myelination increases conduction velocity by

A. Increasing ion leakage

B. Decreasing membrane resistance

C. Saltatory conduction

D. Slowing depolarization

76. During acidosis, respiration rate

A. Decreases

B. Increases

C. Stops

D. Remains unchanged

77. Neurulation leads to formation of

A. Notochord

B. Neural crest and neural tube

C. Somites only

D. Endoderm

78. Hensen's node in chick embryo is functionally equivalent to

A. Neural crest

B. Dorsal lip of blastopore

C. Primitive streak tail

D. Yolk plug

79. Shine-Dalgarno sequence is involved in

A. Termination of translation

B. Initiation of transcription

C. Initiation of translation in prokaryotes

D. DNA replication

80. Rho-dependent termination requires

A. Hairpin loop only

B. ATP-dependent helicase protein

C. DNA ligase

D. Reverse transcriptase

81. Function of CD28 in T-cell activation is

A. Antigen recognition

B. Co-stimulatory signaling

C. Cytokine secretion

D. MHC presentation

82. Variable region diversity in antibodies is generated by

A. DNA replication errors

B. V(D)J recombination

C. RNA splicing

D. DNA methylation

83. Direct Coombs test detects

A. Free antibodies in serum

B. Antibodies attached to RBC surface

C. Complement proteins only

D. Antigen in plasma

84. In blue-white screening of transformed cells, white colonies indicate

A. Functional lacZ gene

B. Non-recombinant plasmid

C. Insertional inactivation of lacZ α-fragment

D. Absence of plasmid uptake

85. In a disarmed Ti plasmid vector system

A. Vir genes are removed

B. T-DNA borders are removed

C. Tumor-inducing genes within T-DNA are removed

D. Entire plasmid is truncated

86. Site-directed mutagenesis is used to

A. Randomly mutate genome

B. Insert large DNA fragments

C. Introduce specific base changes

D. Amplify DNA

87. CRISPR-Cas9 system introduces DNA breaks that are repaired mainly by

A. DNA ligase only

B. Reverse transcriptase

C. Non-homologous end joining or homologous recombination

D. RNA polymerase

88. Stem cells that can differentiate into all cell types except extraembryonic tissues are

A. Totipotent
B. Pluripotent
C. Multipotent
D. Unipotent

89. Downstream processing mainly includes

A. Sterilization of medium
B. Fermentation optimization
C. Product recovery and purification
D. Strain selection

90. e-value in BLAST represents

A. Expression level
B. Evolutionary rate
C. Expected number of chance matches
D. Enzyme activity

91. In a rooted phylogenetic tree, the root represents

A. Most evolved species
B. Common ancestor
C. Longest branch
D. Outgroup only

92. Homoplasy refers to

A. Shared ancestry
B. Similarity due to independent evolution
C. Gene duplication
D. Conserved sequence

93. Molecular clock hypothesis assumes

A. Mutation rate is constant over time

B. All genes evolve equally

C. No natural selection

D. Equal GC content

94. Synbiotics refer to

A. Two probiotic strains combined

B. Prebiotics alone

C. Combination of probiotics and prebiotics

D. Antibiotics plus probiotics

95. Microbiome-produced short chain fatty acids (SCFAs) regulate immune function primarily by

A. Stimulating T regulatory (Treg) cell differentiation

B. Destroying B cells

C. Increasing neutrophil apoptosis only

D. Directly neutralizing toxins

96. Herd immunity occurs when

A. Everyone in a population is infected

B. Significant portion of a population becomes immune, reducing disease spread

C. Only infants are vaccinated

D. Antibiotics are widely used

97. Which of the following is a vector-mediated zoonotic spillover?

A. Ebola virus from bats to humans via bushmeat

B. Lyme disease from ticks carrying Borrelia from deer to humans

C. Nipah virus from bats via contaminated date palm sap

D. Rabies virus from dog bites

98. Which of the following statements about reservoirs, vectors and hosts is correct?

A. Reservoir hosts are always symptomatic

B. Vectors transmit pathogens without being affected

C. Intermediate hosts are never required for viral zoonoses

D. Amplifying hosts cannot increase pathogen load

99. Which of the following is an example of amplifying hosts in zoonotic transmission?

A. Pigs in Nipah virus outbreaks

B. Bats in rabies

C. Mosquitoes in malaria

D. Humans in SARS

100. Which of the following is false regarding biosecurity in laboratories?

A. Personal protective equipment (PPE) reduces exposure to pathogens

B. Biosafety levels (BSL-1 to BSL-4) dictate containment measures

C. Biosecurity only applies to human pathogens

D. Controlled access prevents unauthorized personnel exposure

ROUGH WORK

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