Code No.	V – 2338

Entrance Examination for Admission to the P.G. Courses in the Teaching Departments, 2025

CSS

BIOTECHNOLOGY

For office use only

General Instructions

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

Time : 2 Hours **Max. Marks : 100**

To be filled in by the Candidate									
Register Number	in Figures								
	in words								

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Choose appropriate answer from the options in the questions.

(100 × 1 = 100 marks)

1. Who discovered the concept of "Gene Mutation" in India?
   A. J.B.S. Haldane
   B. S.C. Bose
   C. H.J.B. Orsted
   D. V.S. Iyer

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2. The term "Cell Biology" was coined by Indian scientist:

   A. C.N.R. Rao
   B. R.C. Maheshwari
   C. S.B. Ghosh
   D. B.N.S.K. Sharma

3. The study of "Indian forests" was extensively contributed by which Indian biologist?

   A. V.K. Sharma
   B. B.G. Raghavendra
   C. Birbal Sahni
   D. M.S. Swaminathan

4. A positive result for HBsAg in a patient's blood indicates which of the following?

A. Hepatitis A infection
B. Hepatitis B infection
C. Hepatitis C infection
D. Hepatitis D infection

5. The main pathogenic microorganism responsible for the spoilage of canned foods is:

A. Salmonella
B. *Escherichia coli*
C. *Clostridium botulinum*
D. *Aspergillus flavus*

6. Which of the following microorganisms is used in the production of cheese?

A. *Saccharomyces cerevisiae*
B. *Penicillium roqueforti*
C. *Bacillus subtilis*
D. *Escherichia coli*

7. Which Indian city is home to the National Centre for Cell Science (NCCS)?

A. Mumbai
B. Pune
C. Bangalore
D. New Delhi

8. The first recombinant DNA technology-based vaccine developed in India was for which disease?

A. Covid-19
B. Hepatitis B
C. HIV/AIDS
D. Polio

9. In India, the genetically modified cotton was first approved for commercial cultivation in which year?

A. 2000
B. 2002
C. 1999
D. 2005

10. Which animal is used for the production of human milk proteins, such as lactoferrin, through genetic modification?

A. Cow
B. Sheep
C. Goat
D. Rabbit

11. Which biome is characterized by permafrost and low biodiversity?

A. Desert
B. Tundra
C. Tropical Rainforest
D. Grassland

12. The largest reservoir of carbon in the Earth's system is:

A. The atmosphere
B. Fossil fuels
C. Oceans
D. Terrestrial plants

13. Which organism is commonly used as a vector in creating recombinant vaccines for animals?

A. *E. coli*
B. *Salmonella typhi*
C. *Bacillus subtilis*
D. *Vaccinia virus*

14. The detection of Bovine Spongiform Encephalopathy (BSE) in cattle can involve which modern technique?

A. ELISA
B. Western blot
C. Prion protein detection assays
D. All of the above

15. Trypsin is used in animal cell culture to:

A. Inhibit microbial contamination
B. Stimulate cell division
C. Detach adherent cells from the surfaced
D. Promote DNA replication

16. CO_2 is used in incubators for animal cell culture to:

A. Increase humidity
B. Maintain temperature
C. Regulate pH via bicarbonate buffer
D. Enhance oxygenation

17. Which condition is diagnosed through a lumbar puncture?

A. Pulmonary embolism
B. Meningitis
C. Hepatitis
D. Myocardial infarction

18. What is the role of angiogenesis in cancer?

A. It causes the regression of blood vessels.
B. It allows tumors to grow by forming new blood vessels.
C. It triggers apoptosis in cancer cells.
D. It suppresses the formation of metastasis.

19. In which type of cell is the Golgi body most prominent?

A. Prokaryotic cells
B. Animal cells
C. Plant cells
D. Both animal and plant cells

20. Which of the following structures in the Golgi body is responsible for receiving proteins from the rough endoplasmic reticulum (ER)?

A. Cis face
B. Trans face
C. Lysosome
D. Smooth ER

21. Which marine organism is known for its potential in producing anticancer compounds?

A. Sponge
B. Fish
C. Seaweed
D. Jellyfish

22. The marine bioproducts industry contributes significantly to which of the following sectors?

A. Cosmetics
B. Textile
C. Agriculture
D. Paper

23. Which of the following cells is the primary effector in the defense against intracellular pathogens such as viruses?

A. B cells
B. T helper cells
C. Cytotoxic T lymphocytes (CTLs)
D. Natural killer (NK) cells

24. The technique used to separate DNA fragments by size is:

A. Spectroscopy
B. Centrifugation
C. Gel electrophoresis
D. Flow cytometry

25. The process by which antibodies bind to pathogens and prevent their interaction with host cells is called:

A. Opsonization
B. Neutralization
C. Phagocytosis
D. Complement activation

26. Which of the following is not a stop codon?

A. UAA
B. UAG
C. AUG
D. UGA

27. Genomic imprinting is caused by:

A. Nucleotide deletion
B. Histone methylation
C. Mutations in mtDNA
D. Epigenetic modification

28. Which human chromosome is smallest in size?

A. Chromosome 1
B. Chromosome 13
C. Chromosome 21
D. Chromosome X

29. A cross between AaBb and aabb individuals is called:

A. Monohybrid cross
B. Test cross
C. Selfing
D. F2 cross

30. A zoonotic disease caused by bacteria is:

A. Malaria
B. Rabies
C. Anthrax
D. Dengue

31. The first successful genetic engineering experiment was carried out in:

A. 1950
B. 1973
C. 1980
D. 1990

32. The principal role of mycorrhizae in plant physiology is:

A. Nitrogen fixation
B. Resistance to herbivory
C. Enhanced water and mineral uptake
D. Phytohormone synthesis

33. Citrus canker is caused by:

A. A virus
B. A fungus
C. A bacterium
D. A viroid

34. The economic importance of algae includes all except:

A. Algal blooms
B. Symbiosis with fungi
C. Biofuel production
D. Vaccine manufacture

35. Which geological era is associated with the maximum plant fossil deposition?

A. Cenozoic
B. Mesozoic
C. Paleozoic
D. Precambrian

36. Which feature distinguishes Gymnosperms from Angiosperms?

A. Vascular tissue
B. Naked ovules
C. Presence of leaves
D. Double fertilization

37. Bryophytes are referred to as "amphibians of the plant kingdom" due to their:

A. Lack of roots
B. Moist habitat requirement for fertilization
C. Dual life cycle phases
D. Ability to store water

38. The "shola" forest ecosystem is specific to:

A. Thar Desert
B. Western Ghats
C. Sundarbans
D. Deccan Plateau

39. Biological oxygen demand (BOD) is an indicator of:

A. Heavy metal concentration
B. Radioactivity
C. Organic pollution
D. Algal productivity

40. Which hormone is commonly used to induce parthenocarpy in horticulture?

A. Gibberellic acid
B. Cytokinin
C. Auxin
D. Ethylene

41. Which organelle plays a major role in detoxification of drugs in liver cells?

A. Lysosome
B. Smooth endoplasmic reticulum
C. Golgi apparatus
D. Peroxisome

42. Which enzyme is essential during the S phase of the cell cycle?

A. RNA polymerase
B. DNA polymerase
C. Ligase
D. Telomerase

43. Mutation breeding has been successfully used in India for:

A. Bt cotton
B. IR-8 rice
C. Sharbati Sonora wheat
D. Groundnut variety 'TG26'

44. Darwin's concept of natural selection is based on:
    A. Use and disuse
    B. Inheritance of acquired characters
    C. Differential reproductive success
    D. Mutation rates

45. The molecular clock hypothesis is used to estimate:
    A. Rates of DNA replication
    B. Time since divergence of species
    C. Number of RNA copies
    D. Cellular aging rate

46. Which element is most critical in the evolution of genetic code universality?
    A. Transfer RNA
    B. Ribosomal RNA
    C. DNA polymerase
    D. Promoter sequence

47. In electrophoresis, ethidium bromide binds to DNA via:
    A. Hydrogen bonds
    B. Covalent linkage
    C. Intercalation between bases
    D. Terminal attachment

48. In prokaryotes, translation initiation requires:
    A. Shine-Dalgarno sequence
    B. Kozak sequence
    C. TATA box
    D. Poly-A tail

49. Allergy is primarily mediated by which antibody?
    A. IgA
    B. IgE
    C. IgG
    D. IgM

50. The respiratory quotient (RQ) for carbohydrate oxidation is:
    A. 0.7
    B. 1.0
    C. 1.2
    D. 0.9

51. Which hormone increases sodium reabsorption in the kidney?

A. ADH
B. Insulin
C. Aldosterone
D. Calcitonin

52. Which part of the nephron is primarily responsible for filtration?

A. Loop of Henle
B. Collecting duct
C. Bowman's capsule
D. Proximal tubule

53. Which part of the brain regulates temperature?

A. Cerebellum
B. Medulla
C. Thalamus
D. Hypothalamus

54. Surfactant in lungs is secreted by:

A. Alveolar type I cells
B. Alveolar type II cells
C. Macrophages
D. Ciliated epithelial cells

55. Resting membrane potential in neurons is maintained by:

A. Passive diffusion
B. Na^+/K^+ ATPase
C. Calcium pumps
D. Sodium channels

56. Which metabolic disorder is detected by the Guthrie test?

A. Alkaptonuria
B. Maple syrup urine disease
C. Phenylketonuria
D. Galactosemia

57. In molecular diagnostics, which method would best differentiate between single nucleotide polymorphisms (SNPs)?

A. Southern blotting
B. qPCR
C. DNA microarrays
D. SDS-PAGE

58. The major difference between Type I and Type II restriction enzymes lies in:
    A. Methylation ability
    B. ATP dependency and cleavage site specificity
    C. Presence in plasmids
    D. Their use in gel electrophoresis

59. Which type of enzyme inhibition can be overcome by increasing substrate concentration?
    A. Non-competitive
    B. Competitive
    C. Irreversible
    D. Allosteric

60. The first recombinant therapeutic protein approved for human use was:
    A. Interleukin-2
    B. Recombinant insulin
    C. Erythropoietin
    D. Hepatitis B vaccine

61. Which bioinformatics tool is used to align multiple protein sequences to identify conserved motifs?
    A. BLAST
    B. CLUSTAL Omega
    C. Primer3
    D. MEGA

62. One advantage of using bioreactors in industrial fermentation is:
    A. No need for temperature control
    B. Ability to harvest continuously under controlled conditions
    C. Production of only intracellular proteins
    D. Reduced contamination via open culture

63. Which of the following is NOT a type of scientific experiment?
    A. Exploratory
    B. Deductive
    C. Controlled
    D. Hypothesis-testing

64. Which is a traditional biotechnology application?
    A. Genetic engineering
    B. Hybridoma technology
    C. Fermentation
    D. CRISPR

65. Which of the following is not part of the first law of thermodynamics?
    A. Energy cannot be created
    B. Energy cannot be destroyed
    C. Total energy is conserved
    D. Entropy always decreases

66. ATP synthesis is explained by which hypothesis?
    A. Endosymbiotic
    B. Chemi-osmotic
    C. Enzymatic theory
    D. Thermogenic

67. Which pigment shows resonance energy transfer?
    A. Chlorophyll
    B. Xanthophyll
    C. Phycobilin
    D. All of the above

68. In electrophoresis, SDS is used to:
    A. Maintain pH
    B. Dye the sample
    C. Denature proteins
    D. Amplify DNA

69. Which chromatography is based on ionic interactions?
    A. Paper
    B. Ion-exchange
    C. TLC
    D. Gel filtration

70. The Lineweaver-Burk plot helps determine:
    A. DNA structure
    B. Protein size
    C. Enzyme kinetics
    D. Buffering range

71. Glucose and galactose differ in configuration at carbon number:
    A. 1
    B. 2
    C. 3
    D. 4

72. Triglycerides are composed of:
    A. Fatty acids only
    B. Glycerol only
    C. Glycerol + fatty acids
    D. Phosphate + base

73. Enzyme unit is defined based on:
    A. Substrate concentration
    B. Turnover number
    C. Product formed per time
    D. pH stability

74. Which is a fibrous protein?
    A. Collagen
    B. Insulin
    C. Hemoglobin
    D. Myoglobin

75. Renal threshold refers to:
    A. Amount of blood filtered
    B. Maximum reabsorption capacity
    C. Amount of urea in urine
    D. Urine formation

76. C4 pathway differs from Calvin cycle in:
    A. Uses water
    B. Occurs at night
    C. Fixes CO_2 first with PEP
    D. Is aerobic

77. Beta oxidation of palmitate yields:
    A. 106 ATP
    B. 36 ATP
    C. 18 ATP
    D. 80 ATP

78. Which scientist is known for disproving spontaneous generation?
    A. Edward Jenner
    B. Louis Pasteur
    C. Robert Koch
    D. Antonie van Leeuwenhoek

79. Mycoplasma lacks:
    A. DNA
    B. Cytoplasm
    C. Cell wall
    D. Membrane

80. Anthrax is transmitted through:
    A. Contaminated water
    B. Insects
    C. Inhalation/spores
    D. Contaminated food

81. Rhinovirus causes:

A. Measles
B. Chickenpox
C. Common cold
D. Hepatitis

82. The mangrove plants of Kerala represent a unique:

A. Climatic region
B. Biodiversity hotspot
C. Biogeographical region
D. Riparian community

83. Red Data Book is maintained by:

A. UNESCO
B. WWF
C. IUCN
D. FAO

84. The term "synthetic variety" in plant breeding refers to:

A. A genetically modified variety
B. An interspecific hybrid
C. A variety developed from inter-mating multiple lines
D. A doubled haploid

85. Allopatric speciation involves:

A. Sympatric divergence
B. Geographical isolation
C. Polyploidy
D. Genetic drift within a single area

86. Reproducibility in scientific methodology primarily ensures that:

A. Experimental procedures are creative
B. Results are verified independently under identical conditions
C. Hypotheses are universally accepted
D. Statistical tools are unnecessary

87. Beer-Lambert law is related to:
    A. Refractive index
    B. Absorbance
    C. Emission
    D. Luminance

88. Which of the following reptiles is considered a "living fossil"?
    A. Python
    B. Komodo dragon
    C. Tuatara
    D. Iguana

89. Hox genes are primarily involved in:
    A. Determination of cell cycle checkpoints
    B. Regulation of organ-specific functions
    C. Specification of body axis and segment identity
    D. Apoptosis during gastrulation

90. Which motor protein is crucial for chromosome movement along microtubules during mitosis?
    A. Dynein
    B. Actin
    C. Myosin
    D. Tubulin

91. Which immunoglobulin has the longest half-life in serum?
    A. IgM
    B. IgG
    C. IgA
    D. IgE

92. The BCG vaccine provides protection against which disease?
    A. Hepatitis
    B. Tuberculosis
    C. Diphtheria
    D. Measles

93. Fish glue is mainly derived from:
    A. Fish fins
    B. Fish scales
    C. Fish bones and skins
    D. Fish intestines

94. Which Indian state is the largest producer of inland fish?

A. Kerala
B. Andhra Pradesh
C. Gujarat
D. West Bengal

95. Which species of prawn is a major contributor to India's seafood export?

A. *Penaeus indicus*
B. *Macrobrachium rosenbergii*
C. *Fenneropenaeus monodon*
D. *Neocaridina davidi*

96. The plant *Azadirachta indica* is commercially used for:

A. Oil production only
B. Biopesticide and pharmaceutical uses
C. Paper making
D. Fuel wood only

97. Which of the following biopesticides is considered effective in controlling soil-borne diseases in India?

A. *Bacillus thuringiensis*
B. Trichoderma
C. Pyrethrum
D. Neem oil

98. Who was the first person to receive the Padma Vibhushan for his work in the field of Biotechnology in India?

A. M.S. Swaminathan
B. R.A. Mashelkar
C. V. Ramalingaswamy
D. A.P.J. Abdul Kalam

99. Which viral vector is commonly used in gene therapy trials?

A. Tobacco mosaic virus
B. Bacteriophage lambda
C. Adenovirus
D. Influenza virus

100. The Human Genome Project was completed in:

A. 1999
B. 2001
C. 2003
D. 2005

RESPONSE SHEET

1	A	B	C	D	E	26	A	B	C	D	E	51	A	B	C	D	E	76	A	B	C	D	E
2	A	B	C	D	E	27	A	B	C	D	E	52	A	B	C	D	E	77	A	B	C	D	E
3	A	B	C	D	E	28	A	B	C	D	E	53	A	B	C	D	E	78	A	B	C	D	E
4	A	B	C	D	E	29	A	B	C	D	E	54	A	B	C	D	E	79	A	B	C	D	E
5	A	B	C	D	E	30	A	B	C	D	E	55	A	B	C	D	E	80	A	B	C	D	E
6	A	B	C	D	E	31	A	B	C	D	E	56	A	B	C	D	E	81	A	B	C	D	E
7	A	B	C	D	E	32	A	B	C	D	E	57	A	B	C	D	E	82	A	B	C	D	E
8	A	B	C	D	E	33	A	B	C	D	E	58	A	B	C	D	E	83	A	B	C	D	E
9	A	B	C	D	E	34	A	B	C	D	E	59	A	B	C	D	E	84	A	B	C	D	E
10	A	B	C	D	E	35	A	B	C	D	E	60	A	B	C	D	E	85	A	B	C	D	E
11	A	B	C	D	E	36	A	B	C	D	E	61	A	B	C	D	E	86	A	B	C	D	E
12	A	B	C	D	E	37	A	B	C	D	E	62	A	B	C	D	E	87	A	B	C	D	E
13	A	B	C	D	E	38	A	B	C	D	E	63	A	B	C	D	E	88	A	B	C	D	E
14	A	B	C	D	E	39	A	B	C	D	E	64	A	B	C	D	E	89	A	B	C	D	E
15	A	B	C	D	E	40	A	B	C	D	E	65	A	B	C	D	E	90	A	B	C	D	E
16	A	B	C	D	E	41	A	B	C	D	E	66	A	B	C	D	E	91	A	B	C	D	E
17	A	B	C	D	E	42	A	B	C	D	E	67	A	B	C	D	E	92	A	B	C	D	E
18	A	B	C	D	E	43	A	B	C	D	E	68	A	B	C	D	E	93	A	B	C	D	E
19	A	B	C	D	E	44	A	B	C	D	E	69	A	B	C	D	E	94	A	B	C	D	E
20	A	B	C	D	E	45	A	B	C	D	E	70	A	B	C	D	E	95	A	B	C	D	E
21	A	B	C	D	E	46	A	B	C	D	E	71	A	B	C	D	E	96	A	B	C	D	E
22	A	B	C	D	E	47	A	B	C	D	E	72	A	B	C	D	E	97	A	B	C	D	E
23	A	B	C	D	E	48	A	B	C	D	E	73	A	B	C	D	E	98	A	B	C	D	E
24	A	B	C	D	E	49	A	B	C	D	E	74	A	B	C	D	E	99	A	B	C	D	E
25	A	B	C	D	E	50	A	B	C	D	E	75	A	B	C	D	E	100	A	B	C	D	E

ROUGH WORK

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