

CODE: 63

Booklet Serial No.

Signature Invigilator

**Maulana Azad National Urdu University
PhD Zoology
Entrance Test May 2026
Question Paper cum Answer Script**

Hall Ticket No.

OMR Serial No.

Time: 2hrs

Maximum Marks: 70

INSTRUCTIONS FOR CANDIDATES

1. Candidate should write their Hall Ticket number and OMR number on the space provided above. Candidate should not write their Hall Ticket and OMR number at any other place.
2. This question booklet contains (24) pages. The Candidate should check the booklet before taking the Test. In case of any discrepancy, a new booklet may be provided by the Invigilator.
3. The question booklet consists of Part A and Part B. Part A contains 50 multiple-choice questions, each with four options. The candidate must select the correct answer and mark the corresponding circle on the OMR sheet using a blue or black ballpoint pen. Each question carries one mark. No marks will be awarded if the correct answer is not properly marked against the corresponding question number in the OMR sheet. Further, if more than one option is marked for any question, no marks will be awarded for that question.
4. Part B consists of four descriptive questions, each carrying 5 marks. The answers must be written only in the 8-page answer booklet provided. No additional answer booklet will be issued.
5. There are no Negative marks.
6. At the end of Entrance Test, candidates are allowed to take their question booklet and handover the OMR Sheet and answer booklet to the Invigilator.

Part A
Section 1 – Research Methodology

1. A researcher is performing multicolor flowcytometry experiment what would be the negative control for the experiment?
 - (A) Unstained Cells
 - (B) Fluorescence minus one cells
 - (C) GFP stained cells
 - (D) Beads
2. When a participant is unable to give informed consent due to age or mental incapacity, consent must be obtained from
 - (A) Blood relatives
 - (B) The doctor who is attending
 - (C) Consent from court
 - (D) Legally Authorized Representative
3. Committee for Control & Supervision of Experiments on Animals (CPCSEA) is governed by
 - (A) Prevention of Cruelty to Animals (PCA) Act, 1960
 - (B) Breeding and Experiments Control and Supervision Rules (1998, 2001, 2006)
 - (C) CPCSEA Guidelines on Regulation (2007)
 - (D) All the above
4. A researcher is performing quantitative PCR experiments to compare glycolytic gene expressions in treated vs untreated samples, what should not be the internal control in the experiment?
 - (A) HPRT1
 - (B) Beta tubulin
 - (C) GAPDH
 - (D) RPL13A
5. A researcher wants to clone a gene in pET28a vector using BamHI and XhoI restriction sites, he/she realized that there is a XhoI restriction site in the gene, what should be the best strategy for cloning to maintain the directionality?
 - (A) Digestion of vector with XhoI, blunting with Kenow fragment, BamHI restriction, digestion, Insert the PCR product by digesting with XhoI only
 - (B) Digestion of vector with BamHI, and XhoI, followed by insertion of undigested PCR product
 - (C) Digestion of both vector and PCR product with BamHI, and XhoI, followed by ligation, internal restriction site will not affect cloning
 - (D) It is not possible to maintain the directionality, better to go with blunt end ligation

6. In Beta cells of Islets of Langerhans, the insulin chains A&B along with C peptide are packaged in secretory granules and secreted in equimolar amounts. A diabetes I patient is on recombinant insulin supplement, the best way to measure the production of insulin from patient's Beta cells is
- (A) Stop giving recombinant insulin and then measure the blood insulin
 - (B) Measure the glucose 6 phosphate levels to indirectly measure the patient's insulin activity
 - (C) Measure the glucose levels after the insulin shot
 - (D) Measure the secretion of C peptide
7. Which technique cannot be utilized for gene expression studies?
- (A) Western Blot
 - (B) Southern Blot
 - (C) Northern Blot
 - (D) Quantitative PCR
8. What does R^2 (Coefficient of determination) signify when performing regression?
- (A) It shows the significance
 - (B) Probability of occurrence of any event
 - (C) It signifies how well the regression curve fits with the data provided
 - (D) Certainty around a dataset
9. A researcher has planned to establish a linked between the effect of certain drugs on different types of breast cancer patients; he/she has conducted a survey and selected few ER+, HR+, PR+ and Triple negative breast cancer to perform clinical trials, this represents the example of
- (A) Random Sampling
 - (B) Deliberate sampling
 - (C) Quota Sampling
 - (D) Sequential sampling
10. A researcher planned to evaluate the gene expression profile of early-stage tumor samples, he/she decided to take out biopsy sample for the study, what would be an ideal noncancer control?
- (A) Blood samples
 - (B) Biopsy of non-cancer patient of the same organ
 - (C) Biopsy sample of their kins
 - (D) Biopsy of the same organ but from non-tumorous section

11. A researcher wants to study the effect of antitumor property of a drug, he/she performed experiments in three groups, placebo control, known antitumor drug and third with the test drug. Which statistical test would be appropriate for this experiment?
- (A) One way ANOVA (B) Two-way ANOVA
(C) Student T-Test (D) Chi Square test
12. If codons were made up of four nucleotides instead of three, how many possible codons could be coded using four nucleotides?
- (A) 64 (B) 32
(C) 256 (D) 16
13. A protein of isoelectric point 4.5, what should be the choice for affinity chromatography at physiological pH
- (A) Cation exchange (B) Anion exchange
(C) Any (D) None
14. What would be the molarity of 45 kDa protein at 1 mg/ml concentration?
- (A) 45 micromolar (B) 22 micromolar
(C) 45 nanomolar (D) 22 nanomolar
15. In a western blot experiment multiple bands have been observed, to make sure that the antibody used is specific what would be an appropriate experiment.
- (A) Running a recombinant protein as a control lane
(B) Treating samples with phosphatases to erase the modification
(C) Treating cells with siRNA to check whether all the bands are repressed
(D) Optimize western blot conditions to get rid of extra bands
16. *E. coli* cells are rod-shaped, about $2\ \mu\text{m}$ long and $0.8\ \mu\text{m}$ in diameter. The volume of a cylinder is $\pi r^2 h$, where h is the height of the cylinder. If the average density of *E. coli* is $1.1 \times 10^3\ \text{g/L}$, what is the mass of a single cell?
- (A) 1.1 pg (B) 1.1 ng
(C) 1.6 μg (D) 1.6 pg

17. Which protein-ligand pair has the strongest interaction based on their dissociation constant?
- (A) 1×10^{-6} (B) 5×10^{-9}
(C) 1×10^{-10} (D) 1×10^{-9}
18. The amount of Tris-HCl required to prepare 500 ml, 10mM solution? The molecular weight of Tris-HCl is 157.6 g/mol.
- (A) 315.2 mg (B) 157.6 mg
(C) 788 mg (D) 630.4 mg
19. A researcher wants to prepare 0.01% SDS solution in 5 ml using 10% SDS solution, what would be the correct calculation?
- (A) 10 μ l (B) 100 μ l
(C) 50 μ l (D) 5 μ l
20. The number of polypeptide bonds present in a protein coded by 330 nucleotides, first codon is ATG and last codon is UAG.
- (A) 108 (B) 110
(C) 109 (D) 107
21. The rate of transcription in a bacterium is 100 nucleotides/minute and the average molecular weight of an amino acid is 110 Da. Time taken for synthesis of the mRNA of a protein with molecular weight of 110 kDa is
- (A) 30 minutes (B) 60 minutes
(C) 40 minutes (D) 50 minutes
22. Antibodies are composed of two identical heavy chains and two light chains connected with disulfide linkage. How many bands one should expect to get in SDS PAGE in reducing condition?
- (A) 4 (B) 2
(C) 1 (D) 3
23. If doubling time of *E. coli* is 20 minutes and the initial OD₆₀₀ of culture is 0.1, what would be the OD of the culture after an hour?
- (A) 0.1 (B) 0.2
(C) 0.6 (D) 0.8

24. The average weight of four students is 23 kg, what would be the weight of fourth students if three of them weigh 21, 25, 26 kgs respectively?
- (A) 25 kg (B) 23 kg
(C) 20 kg (D) 26 kg
25. In a Bradford experiment a student calculates the equation as $y = 0.0086x - 0.0049$, while taking standard concentration in mg/ml what would be the concentration of unknown protein if observed optical density is 0.46?
- (A) 108 mg/ml (B) 36 mg/ml
(C) 72 mg/ml (D) 54 mg/ml

Section 2 – Subject Concerned (Zoology)

26. The general structure of all amino acids is same except for:
- (A) Lysine (B) Glycine
(C) Proline (D) Alanine
27. Which of these are rare amino acid in a protein?
- (A) Leucine and serine (B) Lysine and glutamic acid
(C) Tryptophan and methionine (D) Leucine and lysine
28. Arrange the following sequence of collagen synthesis in the correct order.
- 1) The entrance of polypeptide into the rough endoplasmic reticulum
 - 2) Packaged in to transport vesicle
 - 3) Hydroxylation of lysyl and prolyl residues
 - 4) Formation of tropocollagen
 - 5) Covalent cross-linking of tropocollagen
 - 6) Collection of fibrils
- (A) 2, 3, 4, 1, 6, 5 (B) 4, 3, 2, 1, 5, 6
(C) 1, 2, 3, 4, 6, 5 (D) 1, 3, 4, 2, 5, 6
29. How is the secondary structure of a protein stabilized?
- (A) Van der wall forces (B) Hydrogen bonding
(C) Covalent bond (D) Hydrophobic bond

- 7

36. Which of these statements are TRUE for a glycosidic bond?
- (A) The bond between sugar and the nitrogenous base
 - (B) The bond between the two sugar residues
 - (C) The bond between sugar and phosphate
 - (D) The bond between base and phosphate
37. Which of these statements are INCORRECT according to Chargaff's rules?
- (A) The molar ratio of A to T or C to G = 1
 - (B) The sum of purine = sum of pyrimidine
 - (C) The % C+G $\neq$ % A+T
 - (D) The composition of DNA remains the same in all the species
38. A purified DNA sample contains 20% Guanine. Calculate the approximate percentage of purine residues?
- (A) 50%
 - (B) 40%
 - (C) 60%
 - (D) 20%
39. Which form of DNA is described by Watson-Crick model?
- (A) Z-DNA
 - (B) B-DNA
 - (C) A-DNA
 - (D) Quadraplex DNA
40. Which one of the following statements is INCORRECT for Z-DNA?
- (A) Left-handed DNA
 - (B) Mostly found in alternating purine-pyrimidine sequences
 - (C) Only one deep, narrow groove
 - (D) Anti glycosidic bond conformation
41. What is respiratory substrate?
- (A) The compounds which are reduced during respiration
 - (B) The compounds which are oxidized during respiration
 - (C) The intermediate compounds of respiration
 - (D) The end product of respiration
42. Mark the one, which is NOT a lymphoid progenitor cell.
- (A) T-cell
 - (B) B-cell
 - (C) Monocyte
 - (D) NK cells

43. Name the dendritic cell, which does not function as antigen presenting cell?
(A) Follicular dendritic cell (B) Langerhans cell
(C) Myeloid dendritic cell (D) Lymphoid dendritic cell
44. Name the phylum which has a single opening for taking food and throwing out faeces?
(A) Aschelminths (B) Porifera
(C) Annelida (D) Coelenterate
45. Name the first vertebrate which possess amniotic egg?
(A) Amphibia (B) Aves
(C) Reptilia (D) Mammalia
46. Mendel discovered factors which remain its identity in a hybrid, these factors are
(A) Genes (B) Alleles
(C) DNA (D) Chromosomes
47. What is an allele?
(A) Characteristics of an organism (B) Alternate forms of genes
(C) Homologous chromosomes (D) Pair of centrioles
48. Which of the following is NOT Mendel's law of inheritance?
(A) Law of dominance (B) Law of segregation
(C) Law of hetrozygous (D) Law of independent assortment
49. Which of the following is an example of incomplete dominance?
(A) AB blood group (B) *Mirabilis jalapa*
(C) Shape of crown in poultry (D) Mouse coat colour
50. Which of this statement is INCORRECT regarding the function of hormones?
(A) Reproduction and sexual differentiation
(B) Maintenance of internal environment
(C) Maintain body temperature
(D) Development and growth

Part B (Subjective Questions)

Answer all four questions

20 Marks

Research Methodology

1. A researcher wants to understand the efficacy of antimicrobial property of a newly identified drug. Please plan a complete experiment for him with proper control. The researcher expects that this drug might be inhibiting DNA replication process, how should he approach to prove this hypothesis, design the experiment and explain why?
2. Provide a brief overview of the research process. Shed light on different steps involved in the process.

Subject Concerned

3. What are the components in a Polymerase Chain Reaction (PCR) reaction? Describe the role of each component.
4. Differentiate between Immunohistochemistry, ELISA and Western blotting techniques.
