

Hall Ticket Number:

Department of Animal Sciences

ENTRANCE EXAMINATION, February 2013

Ph. D Animal Sciences

Time: 2 hours

Maximum Marks: 75

INSTRUCTIONS: PLEASE READ BEFORE ANSWERING

- *Enter your hall ticket number on this sheet and the answer (OMR) sheet.*
- *Answers have to be marked on the OMR answer sheet following the instructions provided there upon.*
- *Hand over the OMR answer sheet at the end of the examination to the Invigilator.*
- *All questions carry one mark each. Answer all, or as many as you can.*
- *0.33 mark will be deducted for every wrong answer.*
- *There are a total of 10 pages in this question paper. Answer sheet (OMR) will be provided separately. Check this before you start answering.*
- *The question paper consists of Part A and Part B. The marks obtained in Part A will be taken in consideration in case of a tie i.e., when more than one student gets equal marks, to prepare the merit list.*

PART "A"

1. Which one of the following enzymes is crucial for a cell to ensure equal supplies of oxaloacetate and Acetyl-CoA for citric acid biosynthesis?

- | | |
|-------------------------|-----------------------------|
| A) Citrate synthase | B) Isocitrate dehydrogenase |
| C) Pyruvate carboxylase | D) Aconitase |

2. Fastidious microorganisms are those which

- | | |
|---|--|
| A) grow fast under <i>in vitro</i> conditions | B) require special conditions for growth |
| C) cannot be grown under <i>in vitro</i> conditions | D) grow only in the presence of light |

3. How many amino acid residues are present per turn of α -helix?

- | | |
|--------|--------|
| A) 2.6 | B) 4.5 |
| C) 3.6 | D) 5.4 |

D-63

4. Which one of the following techniques is used to detect the localization of the maternal mRNAs in developing embryo?

- A) Northwestern hybridization
- B) *In situ* hybridization
- C) Northern blotting
- D) qRT-PCR

5. Organ transplantation between two individuals with identical HLA alleles at all loci can be described as

- A) Autograft
- B) Syngenic graft
- C) Allograft
- D) Heterograft

6. Deficiency of copper affects the formation of collagen by reducing the activity of

- A) Glycosyl transferase
- B) Galactosyl transferase
- C) Lysyl hydroxylase
- D) Lysyl oxidase

7. Which parasitic infection produces Abblastin antibody?

- A) *Leishmania donovani*
- B) *Trypanosoma lewisi*
- C) *Plasmodium* species
- D) *Chilomastix* species

8. The first organisms to evolve were

- A) Primitive eukaryotes
- B) Aerobic bacteria
- C) Anaerobic bacteria
- D) Photosynthetic bacteria

9. The amount of $MgCl_2$ required for the preparation of 1 L of a 5 mM solution is

- A) 598 mg
- B) 952 mg
- C) 476 mg
- D) 1.196 g

10. Following compounds are capable of forming hydrogen bonds with water except:

- A) Methanol
- B) Methyl acetate
- C) Acetamide
- D) Hexane

11. Morphogen is a

- A) diffusible signaling molecule that plays a role during morphogenesis
- B) protein that facilitates totipotency
- C) protein that mediates cell-cell interactions
- D) diffusible signaling molecule that induces distinct cellular responses based on its local concentration

12. The amino acid residue present most abundantly in water soluble globular protein is

- A) Serine
- B) Histidine
- C) Isoleucine
- D) Lysine

13. In India, maximum biodiversity is observed at

- A) Western Himalayas
- B) Eastern Ghats
- C) Western Ghats
- D) North East Himalayas

14. Genes that segregate with maleness

- A) Polygenic
- B) Holandric
- C) Epistatic
- D) Pleiotropic

15. Which one of the following would be affected by antiviral drug that act by inhibiting viral DNA polymerase?

- A) Cytomegalovirus
- B) Influenza virus
- C) Mumps virus
- D) Measles virus

16. Sickle-cell trait in humans is a classic example of

- A) Selection against recessive homozygotes
- B) Selection for recessive homozygotes
- C) Selection for heterozygotes
- D) Selection against heterozygotes

17. Shortage of acetylcholine in brain is associated with

- A) Parkinson's disease
- B) Alzheimer's disease
- C) Huntington's disease
- D) Schizophrenia

18. Which one of the following classes of RNA characteristically contains unusual purines and pyrimidines?

- A) tRNA
- B) rRNA
- C) mRNA
- D) 16s RNA

19. What is the pH of a solution where the $[H^+] = 4 \times 10^{-4}$ mol/L?

- A) 8.6
- B) 9.6
- C) 10.6
- D) 11.6

20. Electro Mobility Shift Assay is used to detect

- A) Nucleoprotein interactions
- B) DNA-DNA interactions
- C) RNA-RNA interactions
- D) Protein-protein interactions

21. Which one of the following organelles is involved in apoptosis?

- A) Ribosomes
- B) Endoplasmic Reticulum
- C) Peroxisomes
- D) Mitochondria

22. The exposure of DNA to 5-bromouracil results in

- A) Replacement of the AT base pair to CG by pairing with guanine
- B) Deletion of thymine, causing frameshift mutation
- C) Base pairing with adenine and causes no change in the daughter strands during replication
- D) Thymine dimer formation

23 When *lacI* gene is deleted in *E. coli*, the expression levels of β -galactosidase in this mutant would be

- A) negligible
- B) several fold higher than in a normal *E. coli* strain
- C) significantly increased after the addition of lactose
- D) significantly decreased after the addition of lactose

24. Actin filaments and microtubules share all of the following properties except

- A) they are involved in cell motility
- B) they are intrinsically polar structures
- C) they associate with motor proteins
- D) they are assembled from subunits that are heterodimers

25. Which one of the following is not an autoimmune disease?

- A) Rheumatoid arthritis
- B) Type I Diabetes mellitus
- C) Graves disease
- D) Emphysema

PART "B"

26. The primary RNA transcript of the chicken ovalbumin is 7700 nucleotides long but the mature RNA encodes only for 624 amino acids. This difference in size is primarily due to

- A) removal of poly-A tail
- B) mRNA splicing
- C) cleavage of polycistronic sequences
- D) mRNA cleavage

27. "Nosocomial" infection is

- A) hospital acquired
- B) life-threatening
- C) not so serious
- D) related to the nasopharynx

28. "*Pneumococcus*" is a nick name for

- A) *Legionella pneumophila*
- B) *Staphylococcus pneumophila*
- C) *Streptococcus pneumoniae*
- D) *Mycoplasma pneumoniae*

29. In ELISA, the substrate for alkaline phosphatase is

- A) p-nitrophenyl phosphate
- B) BCIP only
- C) o-nitrophenyl phosphate
- D) BCIP and NBT

30. When compared with unphosphorylated protein in SDS-PAGE, the phosphorylated protein migrates at

- A) Faster rate
- B) Slower rate
- C) Same rate
- D) Cannot be detected

31. The rate of reaction catalyzed by the enzyme carbonic anhydrase is

- A) 10^6 molecules of CO_2 per second
- B) 10^5 molecules of CO_2 per second
- C) 10^7 molecules of CO_2 per second
- D) 10^8 molecules of CO_2 per second

32. Thrombin catalyzes the hydrolysis of peptide bonds between

- A) Arg-Gly
- B) Lys-Arg
- C) Trp-Tyr
- D) Tyr-Phe

33. The metal ion present in alcohol dehydrogenase enzyme is

- A) Zn^{++}
- B) Mg^{++}
- C) Mn^{++}
- D) Fe^{++}

34. A reaction occurs spontaneously only if ΔG is negative. Such reaction is known as

- A) Endergonic
- B) Exergonic
- C) Spontaneous
- D) Chemical

35. In glucose metabolism, lactate dehydrogenase reduces pyruvate to lactate while oxidizing

- A) NADH to NAD^+
- B) FADH_2 to FAD^+
- C) FAD^+ to FADH_2
- D) NAD^+ to NADH

36. The peptide bond length between $-\text{CO}$ and $-\text{NH}$ group is

- A) $1.45 \text{ \AA}$
- B) $1.32 \text{ \AA}$
- C) $1.54 \text{ \AA}$
- D) $1.23 \text{ \AA}$

37. Cell surface marker used for identification of myeloid cell populations during flow cytometric analysis is

- A) CD4
- B) CD8
- C) CD11b
- D) CD19

38. Anti- Müllerian hormone causes

- A) Müllerian ducts to develop into Wolffian ducts
- B) Müllerian ducts to regress by apoptosis
- C) Testes to produce testosterone
- D) Wolffian ducts to develop into Vas deferens

39. Which one of the following molecules present the antigen peptides following viral infection?

- A) Toll like receptor
- B) MHC I
- C) MHCII
- D) Fc receptor

40. When the growth of a bacterium necessitates the addition of a particular substance in the medium, the microorganism is called

- A) Heterotroph
- B) Autotroph
- C) Auxotroph
- D) Prototroph

41. Transmission of cyclosporiasis occurs by

- A) Person to person
- B) Fecal oral route
- C) Respiratory route
- D) Sexual transmission

42. Most of the DNA viruses assemble and bud from

- A) Nucleus
- B) Cytoplasm
- C) Golgi apparatus
- D) Endoplasmic reticulum

43. *Aspergillus* infections are usually seen in

- A) Skin
- B) Mouth
- C) Lungs
- D) GI tract

44. Vasopressin plays an important role in

- A) Milk secretion
- B) Renal water absorption
- C) GH secretion
- D) Adrenal steroidogenesis

45. Which one of the following is most virulent of all mycotic pathogens?

- A) *Nistoplasma capsulatum*
- B) *Blastomyces dermatitidis*
- C) *Coccidioides immitis*
- D) *Candida albicans*

46. A bacterium containing sodium ions at a concentration of 0.1 mM lives in a pond that contains sodium ions at 0.005 mM. Evidently, sodium ions are entering the cell by

- A) Active transport
- B) Endocytosis
- C) Diffusion
- D) Osmosis

47. Contaminated food and water is a common mode of infection for

- A) *Ascaris lumbricoides*
- B) *Wuchereria bronchofti*
- C) *Ancylostomaduodenale*
- D) *Leishmania donovani*

48. Which one of the following ligands is involved in platelet adhesion and aggregation?

- A) Fibronectin
- B) Laminin
- C) ICAM
- D) Interleukin

49. Retroviruses replicate by

- A) integrating into the host genome directly
- B) forming an intermediate double-stranded DNA
- C) independently replicating in the host cytoplasm using reverse transcriptase
- D) elaboration of RNA-dependent RNA polymerase activity for duplicating its genetic material.

50. Statocyst, a balancing organ commonly seen in aquatic animals, is absent in

- A) Bivalves
- B) Cephalopods
- C) Sea Urchins
- D) Fishes

51. Which one of the following statements is false with respect to mammalian p450 enzymes?

- A) They are involved in phase I metabolism of xenobiotics
- B) All of them are flavoproteins
- C) Primarily localized in smooth endoplasmic reticulum and mitochondria
- D) Liver contains highest amount but found in most other tissues

52. Mutation of recombination activating genes, *Rag-1* or *Rag-2*, results in a block of B cell development at

- A) Pre-B stage
- B) Pre-Pro-B stage
- C) Pro-B stage
- D) B cell stage

53. Dietary deficiency of cobalamine causes

- A) Rickets
- B) Scurvy
- C) Pernicious anemia
- D) Pellagra

54. Wilson disease is caused due to mutation in

- A) Fibroblast growth factor receptor
- B) LDL receptor
- C) Glc NAc phosphotransferase
- D) Copper-dependent ATPase

55. Following is a common enzymatic marker for plasma membrane

- A) ATP synthase
- B) Sialyl transferase
- C) $\text{Na}^+\text{-K}^+$ ATPase
- D) Galactosyl transferase

56. Adenylyl cyclase activity is inhibited by

- A) Glucagon
- B) Calcitonin
- C) Acetylcholine
- D) Insulin

57. Rickets is caused by nutritional deficiency of

- A) Tocopherol
- B) Calcipherol
- C) Riboflavin
- D) Niacin

58. Which of the following minerals function as prosthetic group in enzymes?

- A) Cobalt, copper and sodium
- B) Copper, selenium and sodium
- C) Cobalt, copper and selenium
- D) Selenium, cobalt and sodium

59. Remodeling of connective tissue matrix involves all of the following except

- A) Trypsin
- B) Cathepsin G
- C) Heparin
- D) Carboxypeptidase

60. The primary function of chemokine, IL-8 is to

- A) Promote influx of leukocytes
- B) Activate eosinophils
- C) Increase vascular permeability
- D) Affect basophil growth and differentiation

61. The following is not an example for integrin.

- A) CD49d
- B) LPAM-1
- C) LFA-1
- D) CD62E

62. Which one of the following membranes would be the most fluid?

- A) A bilayer made of lipids with polyunsaturated 18 carbon-fatty acids
- B) A bilayer made of lipids with saturated 18 carbon-fatty acids
- C) A bilayer made of lipids with polyunsaturated 16 carbon-fatty acids
- D) A bilayer made of lipids with saturated 16 carbon-fatty acids

63. The half-life of radioisotope [^{35}S] is

- A) 8.7 days
- B) 87 days
- C) 164 days
- D) 14 days

64. Taxol is a cytoskeletal drug that acts by

- A) stabilizing microtubule
- B) Stabilizing free tubulin
- C) Stabilizing actin monomers
- D) Stabilizing actin filaments

65. Which one of the following membrane lipids is absent in prokaryotes?

- A) Phospholipids
- B) Glycolipids
- C) Cholesterol
- D) Diacylglycerol phosphate

66. The sugar moiety important for targeting acid hydrolases from the Golgi complex to lysosomes

- A) Mannose-6-phosphate
- B) Glucose-6-phosphate
- C) Ribose-6-phosphate
- D) Galactose-6-phosphate

67. Activation of a gene is marked by

- A) Acetylation
- B) Methylation
- C) Phosphorylation
- D) Myristoylation

68. Which one of the following is not an autosomal recessive disorder in human?

- A) Phenylketonuria
- B) Tay Sachs Disease
- C) Ptosis
- D) Cystic fibrosis

69. Epiboly occurs during

- A) Fertilization
- B) Neurulation
- C) Cleavage
- D) Gastrulation

70. Which one of the following is sex influenced trait?

- A) Beard development
- B) Pattern Baldness
- C) Masculine musculature
- D) Color blindness

71. 5-methyl cytosine substitutions are common as they

- A) Deaminate to thymidine
- B) Deaminate to uracil
- C) Mismatch with adenine
- D) Discriminate parent and daughter strands

72. A mechanism that can cause a gene to move from one linkage group to another is

- A) Inversion
- B) Duplication
- C) Deletion
- D) Translocation

73. Which one the following is a lymphoid lineage?

- A) Mast cells
- B) NK cells
- C) Neutrophils
- D) Platelets

74. The theory of population genetics and evolution includes all except

- A) Mating must be random
- B) Mutation is the source of genetic variation
- C) There is no influx of genes from other populations
- D) No genotype has selective advantage over another

75. The canonical signature motif of amino acid sequence required for export of proteins from nucleus is

- A) -Leu-Ala-Leu-Lys-Leu-Ala-Gly-Leu-Asp-Ile
- B) -Pro-Pro-Lys-Lys-Lys-Arg-Lys-Val
- C) -Lys-Asp-Gly-Leu-COO⁻
- D) -Ser-Lys-Leu-COO⁻

For rough work