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**Department of Animal Sciences**

**ENTRANCE EXAMINATION, February 2014**

**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 14 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.*

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**PART "A"**

**1. Which one of the following is NOT an anabolic product of nitrogen assimilation?**

- A) Glutamate
- B) Urea
- C) Aspartate
- D) Glutamine

**2. Chemical reaction that can be best predicted for the direction is -----**

- A)  $\Delta S$
- B)  $\Delta H$
- C)  $\Delta G$
- D)  $\Delta E$

**3. Identify the odd one**

- |  |  |
|--|--|
| A) Syncytiotrophoblasts and human chorionic gonadotropin | B) Sertoli cells and dihydrotestosterone |
| C) Granulosa cells and estradiol                         | D) Chromaffin cells and adrenaline       |

**4. Lactational amenorrhea is**

- |                                |                                    |
|--------------------------------|------------------------------------|
| A) Polycystic ovarian syndrome | B) Temporary postnatal infertility |
| C) Causal factor for mastitis  | D) Induced lactation               |

**5. Pyrosequencing is especially useful for**

- |  |  |
|--|--|
| A) Sequencing repetitive DNA regions in multiple individuals | B) Sequencing highly condensed DNA regions     |
| C) Sequencing short DNA regions in multiple individuals      | D) Sequencing DNA regions with high AT content |

**6. Choose the mismatch**

- |                              |                              |
|------------------------------|------------------------------|
| A) Cri-du-chat syndrome - 5p | B) Patau Syndrome - 47, + 13 |
| C) Retinoblastoma - 13q, 14  | D) Edwards syndrome - 47, 21 |

**7. CD40 ligand is seen only on**

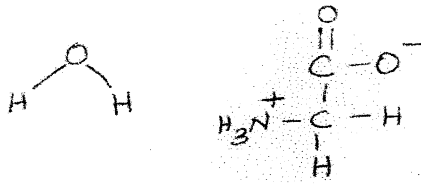
- |                   |                      |
|-------------------|----------------------|
| A) Macrophages    | B) Cytotoxic T cells |
| C) Helper T cells | D) Dendritic cells   |

**8. Neutrophil chemotaxis is mediated by**

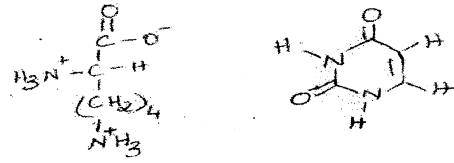
- |               |               |
|---------------|---------------|
| A) IL-8       | B) E-selectin |
| C) Interferon | D) IgM        |

9. Which one of the following pairs of molecules could NOT be able to form the hydrogen bond with each other?

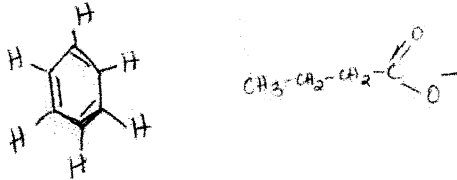
A)



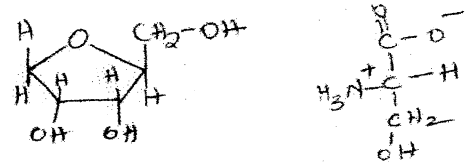
B)



C)



D)



10. Detection of odors (the sense of smell) is mediated by

- A) Ungated Na<sup>+</sup> channels                      B) Gated cation channels  
C) Gated anionic channels                    D) G-protein coupled receptors

11. What is the effect of increased palmitoleate levels on the viscosity of the *E. coli* outer membrane at a constant temperature?

- A) Decreased viscosity                      B) Increased viscosity  
C) Viscosity remains unaltered            D) Initially decreases and then increases

12. Attachment of multiple copies of a small, highly conserved protein called \_\_\_\_\_ to a substrate protein targets the substrate protein for degradation.

- A) Cyclin                                      B) Tubulin  
C) Ubiquitin                                  D) Actin

13. Male breast cancer is primarily associated with mutations in

- A) BRCA1                                      B) BRCA2  
C) NF1    D) RET

14. The common intermediate of carbohydrate, protein and lipid metabolism is

- A) Ammonia
- B) Pyruvic acid
- C) Acetyl coA
- D) phosphoglyceraldehyde

15. In relation to natural selection, evolution is

- A) Process
- B) Mechanism
- C) Outcome
- D) Purpose

16. Which of the following viruses CANNOT translate their genome immediately after entering the cell?

- A) +ve sense RNA viruses
- B) -ve sense RNA viruses
- C) Both
- D) Phages

17. What are the components of ceramide?

- A) Sphingosine + fatty acids
- B) Sphingosine + phosphoric acid
- C) Sphingosine + fatty acids + phosphoric acid
- D) Sphingosine + Glycerol

18. At physiological pH, a protein rich in ----- amino acid provides maximum buffering capacity.

- A) Lysine
- B) Histidine
- C) Aspartic acid
- D) Leucine

19. How many moles of  $\text{Ca}(\text{NO}_3)_2$  are there in 75 ml of 0.25M solution?

- A) 0.00333 mol
- B) 0.0188 mol
- C) 3.33 mol
- D) 18.8 mol

**20. What is the  $[\text{OH}^-]$  of a solution with a pH of 9.0?**

- A)  $1 \times 10^{-5} \text{ M}$                       B)  $1 \times 10^{-9} \text{ M}$   
C)  $1 \times 10^{-6} \text{ M}$                       D)  $1 \times 10^{-4} \text{ M}$

**21. Choose the nucleoside analogue used as anticancer drug?**

- A) Methotrexate                      B) 6-mercaptopurine  
C) Vinblastine                      D) Cytosine arabinoside

**22. Difference between paracentric and pericentric inversion is**

- A) The placement of centromere in the inversion                      B) The involvement of centromeres in the inversion  
C) The number of genes involved in the inversion                      D) The position of the inversion on the chromosome

**23. Pox virus replicates in**

- A) Cytoplasm                      B) Nucleus  
C) Both                      D) Intercellular space

**24. Two-month old breast-fed baby contains maternal ----- in circulation**

- A) IgA                      B) IgM  
C) IgG                      D) IgE

**25. Widows peak hairline in humans is dominant to non-widows peak hairline. If a person has a widows peak hairline, what is his or her genotype?**

- A) Must be homozygous dominant                      B) Must be homozygous recessive  
C) Must be heterozygous                      D) Either heterozygous or homozygous dominant

## PART "B"

26. If an X-linked recessive disorder is in Hardy-Weinberg equilibrium and the incidence in males equals 1 in 100, then the expected incidence of affected homozygous females would be

- A) 1 in 1000
- B) 1 in 4000
- C) 1 in 10000
- D) 1 in 40000

27. Ig idiotypes are found in the

- A) Constant region of the heavy chain
- B) Constant region of the light chain
- C) Hinge region
- D) Variable region of both heavy and light chains

28. Which of the following is a major neuron specific phosphoprotein?

- A) Synapsin I
- B)  $\text{Ca}^{++}$  calmodulin
- C) GAP-43
- D) Calpain

29. Which of the following co-transporter is a symporter?

- A) Glucose- $\text{Na}^+$  co-transporter of intestinal microvilli
- B)  $\text{Na}^+$  -  $\text{H}^+$  co-transporter of fibroblast plasma membrane
- C)  $\text{H}^+$  - sucrose co-transporter of plant vacuoles
- D)  $\text{Na}^+$  -  $\text{Ca}^{2+}$  co-transporter found in cardiac muscles

30. The presence of anti-insulin receptor antibodies in humans causes

- A) Type A insulin resistance
- B) Type B insulin resistance
- C) Type 1 diabetes
- D) Type 2 diabetes

31. Which of the following is caused by trinucleotide (triplet) expansion?

- A) Cystic fibrosis
- B) Duchenne muscular dystrophy
- C) Huntington disease
- D) Osteogenesis imperfecta

**32. The alpha-helical structure of globular proteins is best determined by which of the following technique?**

- A) UV absorption spectroscopy
- B) Electron spectroscopy
- C) Fluorescence spectroscopy
- D) Circular dichroism

**33. Thick filamental skeletal muscles are composed of**

- A) Actin
- B) Myosin
- C) Troponin
- D) Tropomyosin

**34. Type I hypersensitivity can be blocked by**

- A) Histamine
- B) Sodium cromoglycate
- C) Interleukin 5
- D) IgA

**35. Secretory IgA protects external mucosal surface by**

- A) Triggering mast cells
- B) Recruiting phagocytic cells
- C) Preventing microbial adherence to the mucosa
- D) Binding to the epithelial cells

**36. Which one of the following hormones is considered non-functional?**

- A) Somatostatin
- B)  $\gamma T_3$
- C)  $T_4$
- D) Somatomammotropin

**37. Why is the  $T_m$  of DNA monitored using the absorption of UV light at 260 nm?**

- A) GC base pairs absorb more UV than AT base pairs
- B) AT Base pairs absorb more UV than GC base pairs
- C) Single stranded DNA absorbs more UV than double stranded DNA
- D) Double stranded DNA absorbs more UV than single stranded DNA

**38. Which one of the cellular organelles has got major role in reproduction and development?**

- A) Golgi complex
- B) Lysosomes
- C) Peroxisomes
- D) Mitochondria

**39. The sequence element on the DNA template which is first recognized by RNA polymerase II in eukaryotes is known as the**

- A) 5' UTR
- B) Enhancer
- C) TATA box
- D) TATAAT Box

**40. Gels of plasmid DNA preparations show a major band of**

- A) Linear DNA
- B) Supercoiled DNA
- C) Coiled DNA
- D) Chromosomal DNA

**41. Propagation of a regenerative action potential along an axon can be accelerated by which one of the following?**

- A) By increasing the transmembrane resistance
- B) By decreasing the axoplasmic resistance
- C) By narrowing the axon diameter
- D) Shortened intermodal lengths

**42. Which of the following statement is NOT correct?**

- A) Both  $\alpha$  and  $\beta$  tubulin bind GTP
- B)  $\beta$  tubulin hydrolyzes the bound GTP to GDP
- C)  $\alpha$  tubulin hydrolyzes the bound GTP to GDP
- D) GTP bound to  $\alpha$  tubulin is never hydrolyzed or exchanged with free nucleotides

**43. The folding of sheet of cells, the migration of cells and cell death all are mechanisms of**

- A) Pattern formation
- B) Morphogenesis
- C) Differentiation
- D) Growth



**44. Adult human bone grows**

- A) Only at the extreme ends of epiphysis      B) Only in the center – diaphysis  
 C) Throughout its length      D) Only at growth plates between epiphysis and diaphysis

**45. What do plasma membrane extension and acrosome reaction have in common?**

- A) Both involve movement driven by actin polymerization      B) Both involve release of hydrolytic enzyme  
 C) Discharge of calcium ions from the cell      D) Acting sequestering protein thymosin binds to G actin and blocks polymerization

**46. Inclusion bodies known as 'Negri bodies' are found in the infections of**

- A) Hepatitis C virus      B) Foot and Mouth disease virus  
 C) HIV virus      D) Rabies Virus

**47. Which of the following amino acids is NOT converted to Acetyl coA upon metabolism?**

- A) Valine      B) Tyrosine  
 C) Tryptophan      D) Lysine

**48. A culture started with 4 cells and ended with 256 cells. How many generations did the cell go through?**

- A) 5      B) 3  
 C) 6      D) 8

**49. The glycoprotein containing mucoid substance that separates the granulosa cells from the oocyte in an ovary is**

- A) Zona pellucida      B) Ectodermin  
 C) Chorodinin binding protein      D) Ubiquitin

**50. The following holds true for single microRNA**

- A) Involved in translational arrest & degradation of only one mRNA      B) Involved in translational arrest & degradation of multiple mRNAs
- C) Involved in only degradation of multiple mRNAs      D) Involved in degradation of ribosomal RNAs

**51. The maximum possible volume of air which can be taken during inspiration is called as**

- A) Tidal air volume      B) Vital lung capacity
- C) Complementary air volume      D) Total lung capacity

**52. Miracidium is a larval stage in the development of**

- A) *Taenia solium*      B) *Fasciola hepatica*
- C) *Ascaris*      D) *Echinococcus*

**53. Which of the following is a non-specific (systemic) autoimmune disease?**

- A) Hashimoto's thyroiditis      B) Pernicious anaemia
- C) Systemic lupus erythematosus      D) Myasthenia gravis

**54. The condition in which one hormone is elevated to pathologically high levels and mimics the action of another hormone by binding to its receptor is referred to as**

- A) Hormone-receptor internalization      B) Induced hormone-receptor activity
- C) Specificity spill over action      D) Hormone receptor cross aggregation

**55. Urocortin is secreted by**

- A) Urinary bladder      B) Kidney
- C) Brain      D) Liver

**56. A C<sub>19</sub>-steroid formed by the addition of another methyl group to C<sub>10</sub> is**

- A) A gonane  
 B) A pregnane  
 C) An esterase  
 D) An androstane

**57. The undue tendency for closely linked genes on a chromosome to remain associated rather than undergo genetic randomization is termed as**

- A) Tandem duplication  
 B) Gene conversion  
 C) Linkage disequilibrium  
 D) Meiotic crossover

**58. HLA-DR2 is a risk factor for**

- A) Multiple sclerosis  
 B) Rheumatoid arthritis  
 C) Myasthenia gravis  
 D) Ankylosing arthritis

**59. Testicular descent is NOT influenced by**

- A) Antimullerian hormone  
 B) Intra-abdominal pressure  
 C) Androgens  
 D) Inhibin

**60. Changes in ion permeability of membrane of a neuron alter the membrane potential of the cells. Which of the following would cause hyperpolarization?**

- A) Increase in K<sup>+</sup> permeability  
 B) Decrease in Cl<sup>-</sup> permeability  
 C) Increase in Na<sup>+</sup> permeability  
 D) Decrease in K<sup>+</sup> permeability

**61. Platyhelminths are described as**

- A) Flatworms, triploblastic, acoelomates  
 B) Flatworms, diploblastic, acoelomates  
 C) Flatworms, diploblastic coelomates  
 D) Flatworms, triploblastic, coelomates

**62. Neoteny in axolotl larva is the phenomenon where it**

- A) Gains new tone of body muscles
- B) Metamorphoses in normal manner
- C) Becomes sexually mature and can reproduce but retains other systems in their larval state
- D) Prematurely retains all the larval systems without any exception

**63. Which of the following relatives of an individual most likely to share a common HLA haplotype?**

- A) Father
- B) Mother
- C) Sister
- D) Son

**64. Enhancer sequences are characterized by the following means**

- A) DNaseI hypersensitivity, H3K4me2 and p300 binding
- B) DNaseI insensitivity, H3K4me2 and p300 binding
- C) DNaseI hypersensitivity, H3K9me2 and p300 binding
- D) DNaseI insensitivity, H3K9me2 and p300 binding

**65. The term "Chromothripsis" refers to**

- A) Break of chromosomes during apoptosis
- B) Breakdown of chromosomes during cancer
- C) Breakdown of chromosomes during stress
- D) Break of chromosomes during recombination

**66. A culture medium on which only gram positive organisms grow and a yellow halo surrounds *Staphylococcus aureus* colonies is called**

- A) Selective medium
- B) Differential medium
- C) Both
- D) Enrichment medium

**67. Platelet counts go down in the infections of**

- A) Chikungunya virus
- B) Chicken pox virus
- C) Dengue virus
- D) Small pox virus

**68. Which of the following forces is most favorable for protein folding**

- A) Vander waals interactions
- B) Hydrophobic interactions
- C) Hydrogen bonds
- D) Conformational entropy

**69. Which of the following microtubule is less stable and exhibit little cycling between disassembled and assembled states?**

- A) Axonal microtubule
- B) Flagellar microtubule
- C) Spindle microtubule
- D) Axonal, flagellar and spindle microtubules have same stability

**70. DNA methylation is associated with**

- A) GT-AG
- B) CpG islands
- C) CAAT box
- D) TATA Box

**71. Pulse-field gel electrophoresis is useful for separating**

- A) Single stranded RNA
- B) DNA fragments in identical length
- C) Large DNA fragments
- D) Chromosomal DNA

**72. Initial milk ejection from breast is accomplished by**

- A) Somatomammotropin
- B) Oxytocin
- C) Placental lactogen
- D) Prolactin

**73. Which one of the following is odd one with reference to oxygen?**

- A) Myoglobin
- B) Hemoglobin
- C) Hemocyanin
- D) Globulin

74. What will be the molarity of a solution having 72.06g of  $\text{BaCl}_2$  in required amount of water to make up 800 ml? (Mol mass of  $\text{BaCl}_2$  is 208.23 g/mol)

- A) 0.433 M
- B) 4.33 M
- C) 5.33 M
- D) 0.866 M

75. The grey crescent of frog's embryo represents the future

- A) Anterior side of developing embryo
- B) Posterior side of developing embryo
- C) Ventral side of the developing embryo
- D) Dorsal side of the developing embryo

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**For rough work**