

Hall Ticket Number:

Department of Animal Biology

ENTRANCE EXAMINATION, February 2015

Ph. D Animal Biology

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 OMR answer sheet at the end of the examination.*
- *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.*

PART "A"

1. One of the following is NOT a ω -6 poly unsaturated fatty acid.

- | | |
|---------------------|-------------------------------------|
| A) Linoleic acid | B) γ -linolenic acid |
| C) Palmitoleic acid | D) Dihomo- γ -linolenic acid |

2. A competitive inhibitor of an enzyme

- | | |
|--|--|
| A) increases K_m without affecting V_{max} | B) decreases K_m without affecting V_{max} |
| C) increases V_{max} without affecting K_m | D) decreases V_{max} without affecting K_m |

3. An inborn error, maple syrup urine disease is due to deficiency of the enzyme

- A) sovaleryl-CoA-hydrogenase
- B) Phenylalanine hydroxylase
- C) Adenosyl transferase
- D) α -Ketoacid decarboxylase

4. Various transcripts are located in distinct regions of developing embryo which can be best demonstrated by

- A) Northern hybridization
- B) Real-time PCR
- C) *In situ* hybridization
- D) Western blotting

5. How much $MgCl_2$ is required to make one litre of 0.1 molar $MgCl_2$ solution?

- A) 0.95 g
- B) 9.5 g
- C) 95 g
- D) 950 g

6. The pH of blood is 7.4 when the ratio between H_2CO_3 and $NaHCO_3$ is

- A) 1:10
- B) 1:20
- C) 1:30
- D) 1:15

7. Fatty acids can be transported into and out of cell membrane by

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

8. Which one of the following confers passive immunity?

- A) Hepatitis B vaccine
- B) Hepatitis B immunoglobulin
- C) MMR vaccine
- D) Infection

9. Cystic fibrosis (CF) is caused by a recessive allele. A child has CF, even though neither of the parents shows CF symptoms. If this couple has another child, what is the probability he or she will NOT have CF?

- A) 1/4 B) 2/4
C) 3/4 D) 1/3

10. Which one of the following animals use extensively, anal gland secretion for territory marking?

- A) Earthworm B) Insects
C) Fishes D) Big cats

11. Wheat germ agglutinin binds strongly to

- A) Surface glycoproteins on activated T- and B-cells. B) Surface lipoproteins on activated T- and B-cells.
C) Surface glycoproteins on resting T-cells. D) Surface lipoproteins on resting T-cells.

12. Nude mice are deficient in

- A) Macrophages B) Mature B cells
C) NK Cells D) Mature T cells

13. Alpha-fetoprotein is an oncofetal antigen which is a diagnostic marker for

- A) Colon cancer B) Liver cancer
C) Chronic myeloid leukemia D) Breast cancer

14. How are trypanosomes able to evade the host immune system?

- A) They have an antiphagocytic capsule B) They are obligate intracellular parasites
C) They continuously alter their surface antigens D) They produce enzymes that digest antibodies

15. Which one of the following ions is critically associated with meiotic maturation of the mammalian oocyte?

- A) Ca^{2+} B) Zn^{+}
C) K^{+} D) Mg^{2+}

16. The reaction mixture for the assay of glutamate dehydrogenase contains 100 µl of 0.1 M NAD^{+} . The quantity of NAD^{+} added is

- A) 1 µmoles B) 10 µmoles
C) 100 µmoles D) 1000 µmoles

17. One of the following is NOT associated with gluconeogenesis.

- A) G6PD B) Glucose 6-phosphatase
C) FDPase D) PEPCK

18. Activation of phospholipase C causes all of the following EXCEPT

- A) Production of diacyl glycerol B) Release of Ca^{2+} from intracellular stores
C) Cleavage of membrane-bound PIP_3 D) Dephosphorylation of proteins

19. Which one of the following virus is NOT used in gene therapy?

- A) Retrovirus B) Adenovirus
C) Adeno-associated virus D) Polyomavirus

20. The aminoglycosides are a very active group of antibacterial agents, particularly against Gram-negative *Bacilli*. Identify their mode of action from the list.

- A) Disruption of cytoplasmic membrane function B) Inhibition of bacterial cell wall synthesis
C) Inhibition of protein synthesis D) Inhibition of bacterial DNA gyrase

21. Antibody-dependent cytotoxicity is associated with

- A) Type I Hypersensitivity
- B) Type II Hypersensitivity
- C) Type III Hypersensitivity
- D) Type IV Hypersensitivity

22. Potent environmental estrogen which was banned by FDA as drug for promoting clear cell carcinoma in 1971 is

- A) Nonylphenol
- B) Atrazine
- C) Diethylstilbestrol
- D) Estradiol

23. Which one of the following signal cascades depends on cell-cell interactions?

- A) Ras signaling
- B) Jak-Stat signaling
- C) Notch signaling
- D) NO signaling

24. Neoteny is seen in

- A) Frogs
- B) Salamanders
- C) Snakes
- D) Crocodiles

25. Epithelial mesenchymal interaction required for the development and differentiation of liver and pancreas

- A) Ectoderm and Mesoderm
- B) Ectoderm and Endoderm
- C) Endoderm and Mesoderm
- D) Endoderm and neural crest

PART "B"

26. Which one of the following animal uses Osphradium to test the purity of water?

- A) *Pila*
- B) *Asterias*
- C) *Stichodactyla*
- D) *Hydra*

27. GABA (gama amino butyric acid) is

- A) post-synaptic excitatory transmitter B) post-synaptic inhibitory transmitter
C) activator of glia-cell function D) inhibitor of glia-cell function

28. Which one of the following hormones is NOT produced by adrenal cortex?

- A) Aldosterone B) Ponasterone
C) Cortisol D) Testosterone

29. In mammalian DNA, transcription regulatory regions containing CpG islands are inactivated by

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

30. A 'fastidious' microorganisms is the one that

- A) Shows rapid growth in minimal medium B) Can utilize only glucose as a carbon and energy source
C) Requires specialized nutrients for growth D) Cannot be cultured in artificial media

31. A person heterozygous for an autosomal dominant disorder marries an individual who is homozygous recessive and have children, which statement is CORRECT?

- A) All of their children will be carriers B) None of their children will have the disorder
C) All of their children will have the disorder D) Half of their children will have the disorder

32. A mutation is most likely to alter the three-dimensional conformation of a protein if

- A) There is a substitution of a hydrophobic amino acid for a hydrophilic amino acid B) Valine is substituted for leucine
C) It changes the amino acid at the amino-terminus D) It places proline in the middle of an α -helix.

33. Which one of the following statements about the synthesis of carbamoyl phosphate by carbamoyl phosphate synthase-I is **INCORRECT**?

- A) The enzyme catalyzes the rate-limiting reaction in the urea cycle. B) The reaction is reversible
- C) The reaction is allosterically activated by N-acetyl glutamate D) The reaction requires two high-energy phosphates for each carbamoyl phosphate molecule to be synthesized

34. One of the following enzymes is involved in ammonia detoxification.

- A) Glutaminase B) Lactate dehydrogenase
- C) Glutamate dehydrogenase D) Malate dehydrogenase

35. Oxidation of which substance in the body yields most calories?

- A) Lipid B) Glucose
- C) Glycogen D) Protein

36. Riboflavin is a coenzyme in the reaction catalyzed by the enzyme

- A) Acyl CoA synthetase B) Enoyl CoA dehydrogenase
- C) Acyl CoA dehydrogenase D) 3-hydroxy acyl CoA dehydrogenase

37. SDS-PAGE of the secretory IgA immunoglobulin shows _____ number of bands.

- A) 1 B) 2
- C) 3 D) 4

38. The 'Origin of Life on Earth' was proposed by

- A) Alexander Ivanovich Oparin B) Charles Darwin
- C) Friedrich Miescher D) Oswald Avery

39. Which one of the following statements is **NOT** correct?

- | | |
|---|--|
| A) Hypoparathyroidism results in hypocalcemia. | B) Postmenopausal women normally suffer from osteoporosis. |
| C) FSH deficiency leads to hypogonadism associated with failure of germ cell maturation | D) Secretin regulates pancreatic hormone secretion |

40. Which one of the following represents the most reduced form of carbon?

- | | |
|----------------------|-------------------------|
| A) R-CH ₃ | B) R-COOH |
| C) R-CHO | D) R-CH ₂ OH |

41. Morphallactic pattern of regeneration is seen in

- | | |
|----------------------|-------------------------|
| A) Wall lizard tail | B) Salamander fore limb |
| C) Frog tadpole tail | D) Hydra body |

42. Which one of the following statements is **NOT** true?

- | | |
|---|--|
| A) Fosmid clones are similar in size as cosmids | B) Fosmid clones contain replicons derived from F factor |
| C) BAC clones are like Fosmids | D) HMW DNA is the source for generating Fosmids |

43. The activity of kinins is modulated by

- | | |
|-------------------------|-------------------------|
| A) Prostaglandins | B) Ca ⁺⁺ |
| C) Increased cAMP level | D) Increased cGMP level |

44. Following recombinant protein is commercially produced from mammalian cell culture?

- | | |
|----------------|---------------------------------|
| A) Insulin | B) Tissue plasminogen activator |
| C) Hepatitis B | D) Taq polymerase |

45. An important function of vitamin A is

- A) To act as coenzyme for a few enzymes B) To maintain the integrity of epithelial tissue
C) To play an integral role in protein synthesis D) To prevent hemorrhages

46. The neurologic disturbances seen in Niemann-Pick disease are associated with the accumulation of _____ in the central nervous tissue

- A) Phosphatidyl choline B) Phosphatidyl serine
C) Sphingomyelin D) Gangliosides

47. Bacteriophage consists of

- A) Only proteins B) Nucleoproteins
C) Only DNA D) Only RNA

48. In which pair of diseases, both are caused by viruses?

- A) Measles & rabies B) Syphilis & AIDS
C) Tetanus & Typhoid D) Whooping cough & sleeping sickness

49. Which one of the following is a cell-coded protein formed in response to infection with most animal viruses?

- A) Histone B) Antibody
C) Antigen D) Interferon

50. Which one of the following co-enzyme is also called as co-substrate of enzyme?

- A) NAD^+ B) ATP
C) FADH_2 D) Heme

51. Membrane carrier proteins differ from membrane channel proteins by which of the following characteristics?

- A) Carrier proteins are glycoproteins, while channel proteins are lipoproteins.
- B) Carrier proteins can mediate active transport, while channel proteins cannot.
- C) Carrier proteins do not bind to the material transported, while channel proteins do.
- D) Carrier proteins transport molecules down their electrochemical gradient, while channel proteins transport molecules against their electrochemical gradient.

52. The unit of the molar extinction coefficient is

- A) $L \cdot \text{mole}^{-1} \cdot \text{cm}^{-1}$
- B) $L \cdot \text{mole} \cdot \text{cm}^{-1}$
- C) $L \cdot \text{mole}^{-1} \cdot \text{cm}$
- D) $L^{-1} \cdot \text{mole}^{-1} \cdot \text{cm}^{-1}$

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

- A) A decrease in the transmembrane resistance
- B) A decrease in the axoplasmic resistance
- C) Reduced myelin wrapping
- D) Shortened internodal lengths

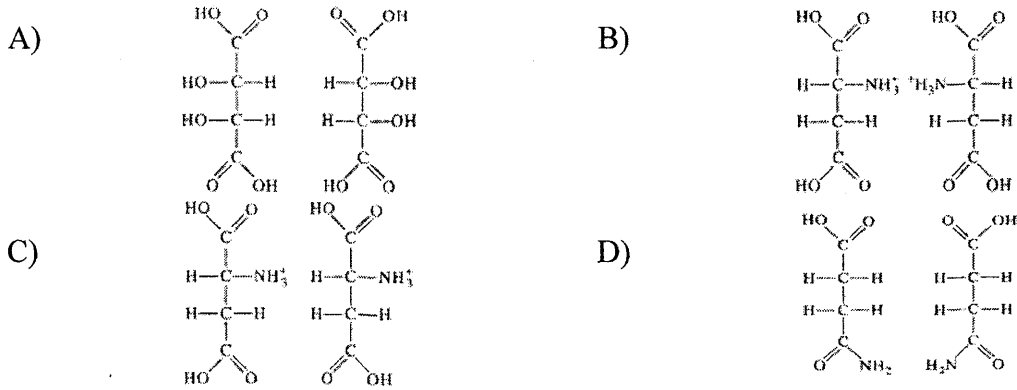
54. Which of the following is true about a circular double-stranded DNA containing 21% adenosine?

- A) It has 21% guanosine
- B) It has 58% guanosine
- C) It has 29% guanosine
- D) It has 42% guanosine

55. Which among the following vaccines is NOT an attenuated whole organism?

- A) Salk
- B) BCG
- C) Sabin
- D) Tetanus

56. Which one of the following pairs of structures depicts stereoisomers according to conventional rules of projection?



57. Elevated levels of circulating glucagon are associated with which one of the following?

- A) Increased activity of phosphofruktokinase-2 B) Decreased activity of fructose 2,6-bisphosphatase
- C) Decreased activity of fructose 1,6-bisphosphatase D) Increased activity of 1,6-bisphosphatase

58. DNA polymorphism in one of the following led to the development of DNA fingerprinting as a forensic tool.

- A) VNTR B) Intronic sequencing
- C) Enhancer elements D) Heteroduplex DNA

59. Inhibin hormone is commonly produced by following endocrine glands.

- A) Pituitary B) Pancreas
- C) Gonads D) Parathyroid

60. Which glycosaminoglycan does NOT contain uronic acid?

- A) Dermatan sulphate B) Keratan sulphate
- C) Chondroitin sulphate D) Heparan sulphate

61. All of the following statements regarding ketone bodies are true EXCEPT

- A) They may result from starvation B) They include acetoacetic acid and acetone
C) They may be excreted in urine D) They are formed in kidneys

62. Which of the following is NOT mediated by lipid component of the membrane?

- A) Channel formation B) Barrier to passage of water soluble substances
C) Fluidity of membrane D) Structural boundary

63. Peptide present in egg jelly of sea urchin, which plays important chemotactic role during fertilization, is

- A) Fertilizin B) Resact
C) Bindin D) Activin

64. Congenital adrenal hyperplasia is known to cause

- A) Female pseudohermaphroditism B) Male pseudohermaphroditism
C) Turner's syndrome D) Klinefelter's syndrome

65. Which one of the following is NOT a bHLH family protein?

- A) MyoD B) Pax1
C) Myf 5 D) c-Myc

66. Protein critical for establishment of anterior-posterior polarity in *Drosophila* embryo is

- A) β -catenin B) Kruppel
C) Bicoid D) Fushi tarazu

67. A fatty acid which is NOT synthesized in human body and has to be supplied in the diet

- A) Palmitic acid
- B) Oleic acid
- C) Stearic acid
- D) Linoleic acid

68. Lipases can act between pH range of

- A) 2.5-4
- B) 3.5-5
- C) 5-7
- D) 4-5

69. Which one of the following is NOT required for the RecA-dependent recombination between two DNA molecules?

- A) Strand migration
- B) Ligation
- C) Nuclease digestion
- D) Mismatch repair

70. An *E. coli* strain lacking DNA polymerase I would be deficient in DNA

- A) Repair
- B) Methylation
- C) Transcription
- D) Degradation

71. Which of the following types of information CANNOT be determined from the traditional Northern blotting technique?

- A) The size of an mRNA species
- B) The half-life of an mRNA species
- C) The relative levels of an mRNA species in different tissues
- D) The amino acid sequence of the protein coded by an mRNA species

72. The most common form of speciation is

- A) Sympatry
- B) Allopatry
- C) Parapatry
- D) Antipatry

73. Kinesis, animal's response to stimulus, is

- A) Directional
- B) Uni-directional
- C) Multi-directional
- D) Non-directional

74. Various oncogenes may encode all of the following EXCEPT

- A) Growth factors
- B) Kinases
- C) Receptors
- D) Tumor suppressor proteins

75. Milk is deficient of which mineral?

- A) Calcium
- B) Iron
- C) Potassium
- D) Sodium

For rough work