

**ENTRANCE EXAMINATION 2018**  
**(PhD admissions - January 2019 Session)**  
**Ph. D Animal Biology**

**Hall Ticket Number:**

**Maximum Time: 2 Hours**

**Maximum Marks: 80**

**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 11 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 into 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 class of vertebrates has the highest number of endangered species?
 

A) Reptiles	B) Mammalia
C) Aves	D) Pisces
2. In Ctenophores, what organs are being used for locomotion
 

A) Pharynx	B) Ctenes
C) Pseudopodia	D) Costae
3. Sexually, earthworms (Family: Oligochaetes) are
 

A) Single sexed	B) Hermaphrodite but not self-fertilizing
C) Hermaphrodite and self-fertilizing	D) Parthenogenic

4. Which one of the following statements is logically erroneous in terms of DNA melting?

- A) High GC content enhances  $T_m$  of ds-DNA.      B) Presence of two hydrogen bonds between adenine and thymine decreases the temperature of ds-DNA denaturation thereby changing  $T_m$ .
- C) Presence of three hydrogen bonds between guanine and cytosine increases the temperature of ds-DNA denaturation thereby changing  $T_m$       D) Long DNA enhances  $T_m$

5. Irreversible inhibitors of enzymes often form covalent bonds with

- A) any amino acids at or near active site      B) tryptophan or phenylalanine residues at or near active site
- C) Serine or cysteine residues at or near active site      D) any positively charged amino acid residues at or near active site

6. Migration of individual cells from surface layer into the interior of embryo during early embryonic development is known as

- A) Ingression      B) Invagination
- C) Integration      D) Epiboly

7. Organisms can be classified according to their source of energy and their source of carbon for the synthesis of cellular material. Accordingly Lithotrophs derive carbon and energy from:

- A) Organic and organic compounds      B) organic and Sun light
- C) Organic and Inorganic compounds      D) Inorganic compounds and Sunlight

8. When rat liver tissue homogenate is subjected to differential centrifugation, the mitochondria, lysosomes and peroxysomes can be precipitated by centrifugation at

- A) 150,000g for 3h      B) 80,000g for 1h
- C) 5,000g for 10 mins      D) 20,000g for 20 mins

9. The following bond in the biomolecules has the highest bond dissociation energy in kJ/mol

- A) C=O      B) N≡N
- C) S-S      D) P=O

10. One of the functional groups in the biomolecules has the ester linkage

- A)  $R^1COOR^2$       B)  $RCOO^-$
- C)  $R^1COR^2$       D)  $RCOH$

**11. The proteins derived from two homologous genes that occur in the *same* species, and presumed to be derived by gene duplication followed by gradual changes in the sequences of both copies are termed as**

- A) Orthologs
- B) Paralogs
- C) Analogs
- D) Homologs

**12. The polyunsaturated fatty acid, Docosahexaenoic acid (DHA), in humans is synthesised from**

- A) Linolenic acid
- B)  $\gamma$ -Linolenic acid
- C)  $\alpha$  Linolenic acid
- D) Dihomo  $\gamma$ -Linlenic acid

**13. The function of enzymes and other catalists is to**

- A) Increase the activation energy
- B) Decrease the activation energy
- C) Increase the substrate concentration
- D) Decrease the substrate concentration

**14 The enzymes, which have greater effect on the rate of the overall pathway, are called as the regulatory enzymes. One of the following is a regulatory enzyme of glycolysis**

- A) Phosphoglucose isomerase
- B) Aldolase
- C) Glucose 6 Phosphatase
- D) Phosphofructo kinase

**15. When dominant epistasis exists between two loci the classical 9:3:3:1 ratio changes to**

- A) 9:3:4 ratio
- B) 9:6:5 ratio
- C) 12:3:1 ratio
- D) 15:1 ratio

**16. In drosophila XXY is female. In humans it represents an abnormal male because**

- A) Y-chromosome induces male traits in humans
- B) Y-chromosome is essential for female sex in drosophila
- C) Y-chromosome is not essential for male sex in humans
- D) X-chromosome induces male traits in humans

**17. Which Ig can cross placenta and provide passive immunity to new born**

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

**18. What is the function of the FAB region in an antibody?**

- A) Bind to receptors on macrophages
- B) Bind to receptors on T cells
- C) Bind to antigens
- D) Determine the class/type of antibody

**19. The yolky side of an egg is**

- A) Animal side
- B) Coronal side
- C) Sagittal side
- D) Vegetal side

**20. Hans Spemann performed experiments to understand the concepts of**

- |                    |                |
|--------------------|----------------|
| A) Growth          | B) Development |
| C) Differentiation | D) Selection   |

**21. During gastrulation in *Xenopus*, the blastocoel**

- |   |   |
|---|---|
| A) Becomes the gut                                | B) Is displaced and its original location becomes endoderm lined cavity, the archenteron, which is a precursor to the gut |
| C) Is filled with endodermal cells and disappears | D) is filled with mesoderm and disappears   |

**22. Closure of the neural plate to form a rod, followed by opening of lumen describes:**

- |                              |                          |
|------------------------------|--------------------------|
| A) Primary neurulation       | B) Secondary neurulation |
| C) Coordinated shape changes | D) The keyhole stage     |

**23. Neurotransmitter found in postganglionic sympathetic nerve terminal**

- |                  |                |
|------------------|----------------|
| A) GABA          | B) Epinephrine |
| C) Acetylcholine | D) Both B & C  |

**24. Within the first few hours of sleep there is a huge surge in the release of**

- |                 |              |
|-----------------|--------------|
| A) Cortisol     | B) Melatonin |
| C) Testosterone | D) Melanin   |

**25. The Nobel Prize in 2017 for Physiology or Medicine was given jointly to the discovery of**

- |  |   |
|--|---|
| A) Cancer immunotherapy                      | B) Mechanism of autophagy   |
| C) Molecular mechanisms of circadian rhythms | D) Novel therapy against infections caused by roundworm parasites |

**26. Formation of Vulva in *C.elegans* involves**

- |                 |                         |
|-----------------|-------------------------|
| A) Anchor cell  | B) Sertoli cell         |
| C) Kupffer cell | D) Islets of Langerhans |

**27. The genes that regulate the development of various anatomical structures in an organism are**

- |                    |                       |
|--------------------|-----------------------|
| A) Gap genes       | B) Hox genes          |
| C) Pair-rule genes | D) Segmentation genes |

**28. The source of energy for the ribosomal protein synthesis is**

- A) ATP
- B) CTP
- C) GTP
- D) UTP

**29. A protein, consisting of two identical polypeptide chains of 35 kDa, when separated by SDS-PAGE, migrates as a polypeptide of**

- A) Does not migrate and remains in the well
- B) 17.5 kDa
- C) 70 kDa
- D) 35 kDa

**30. Which of the following is NOT a phagocytic cell?**

- A) Neutrophil
- B) Macrophage
- C) Mast cell
- D) Dendritic cell

**31. Which of the following bonds is NOT responsible for the tertiary structure of a protein?**

- A) Covalent bonds
- B) Hydrophobic interactions
- C) Hydrogen bonds
- D) Ionic bonds

**32. Which of the following techniques CAN NOT be used for the determination of the molecular mass of a protein?**

- A) SDS-PAGE
- B) Gel filtration
- C) MALDI-TOF
- D) Ion-exchange chromatography

**33. The charge on a DNA molecule is negative. The force required to accelerate these molecules towards the anode is directly proportional to the number of**

- A) Nitrogenous bases
- B) Phosphate groups
- C) Sugar molecules
- D) Both Sugar molecules and nitrogenous bases

**34. Genetic traits of seeds are noted as follows:**

**L = long, l = short, W = wrinkled, w = smooth, Y = yellow, y = white, R = ribbed, r = grooved.**

**Which of the following is the genotype for a short, wrinkled, yellow, grooved seed?**

- A) llWwyyrr
- B) LLWWyYRr
- C) LlWwYYRr
- D) llWwYYrr

**35. If the diploid number of chromosomes is 48 in tobacco, how many chromosomes will be found in the pollen grain?**

- A) 96
- B) 48
- C) 24
- D) 12

**36. The most common form of severely affected people, having more than 1000 repeats of the CTG triplet, are called**

- A) Myotonic dystrophy
- B) Fragile X syndrome
- C) Retinoblastoma
- D) Alzheimer's disease

**37. When one gene will code and control the phenotype or expression of several different and unrelated traits, the condition is called Pleiotropy. The following disease is the example of Pleiotropy**

- A) Down's syndrome
- B) Phenylketonuria
- C) Lesch-Nyhan syndrome
- D) Niemann-Pick syndrome

**38. During embryonic development, which of the following morphogenetic process is NOT regulated by mesenchymal cells?**

- A) Condensation
- B) Delamination
- C) Migration
- D) Extracellular matrix

**39. Following method is used to determine the binding of a protein to RNA**

- A) Northern blotting
- B) Southern blotting
- C) Western blotting
- D) North-Western blotting

**40. Cloning of Dolly is the outcome of one of the following techniques:**

- A) Somatic cell nuclear transfer
- B) Induced pluripotent stem cell
- C) Crisper/Cas-9
- D) Embryo freezing

## PART "B"

**41. Which one of the following techniques is used to determine the cell cycle status of a given cell population?**

- A) Confocal microscopy
- B) Electron microscopy
- C) FACS
- D) FISH

**42. During embryonic development, which of the following morphogenetic process is NOT regulated by mesenchymal cells?**

- A) Condensation
- B) Delamination
- C) Migration
- D) Extracellular matrix

**43. Urea is synthesized in**

- A) Cytoplasm only
- B) Mitochondria only
- C) Both cytoplasm and mitochondria
- D) Lysosomes only

**44. Humans have 23 pairs of chromosomes, while our closest relatives, chimpanzees, have 24 pairs. Chromosome studies indicate that at some point early in human evolution, two chromosomes simultaneously broke into one large and one small portions each. The two large parts combined to form one large chromosome, and the two small parts combined to form a much smaller chromosome (which was subsequently lost). This important chromosomal change could best be described as**

- A) nondisjunction followed by deletion      B) translocation followed by deletion
- C) duplication followed by deletion      D) translocation followed by inversion

**45. A patient diagnosed with Homocystinuria should be supplemented with all of the following vitamins except**

- A) Vitamin B12      B) Vitamin C
- C) Folic acid      D) Pyridoxal Phosphate

**46. Consider a family where a father and son both have retinoblastoma. DNA analysis from the child's tumor shows only a single allele from the Rb locus on chromosome 13. Both parents are heterozygous in blood, as is the child. Which allele would you expect to be preserved in the tumor?**

- A) There is a 50:50 chance that it is the mother's or father's allele      B) Both alleles would be abnormal due to genetic rearrangement
- C) Father's allele      D) Mother's allele

**47. Which one of the following is a haemoflagellate parasite?**

- A) Plasmodium      B) Entamoeba
- C) Trichomonas      D) Trypanosome

**48. Dumdum fever is caused by**

- A) Virus      B) Bacteria
- C) Protozoan Parasite      D) Fungi

**49. Arsenate binds to SH group of the enzyme to inhibit its activity. This mode of inhibition is called as ----- inhibition.**

- A) Non-competitive      B) Competitive
- C) Un-competitive      D) Complimentary

**50. When electrophoresis is carried out at higher voltage, the DNA fragments move faster because of**

- A) Increase in current      B) Increase in ionic strength
- C) Decrease in resistance      D) Decrease in mass

**51. MgCl<sub>2</sub> is added in a PCR reaction as it**

- A) Maintains pH      B) Promotes polymerase activity
- C) Increases the primer annealing      D) Helps in denaturation of DNA

**52. Hemoglobin has the highest affinity towards**

- A)  $O_2$
- B)  $CO_2$
- C) CO
- D) NO

**53. In response to the nerve impulse, the release of  $Ca^{2+}$  from sarcoplasmic reticulum occurs and initiates muscle contraction. The  $Ca^{2+}$  released then binds to a protein called**

- A) Troponin
- B) Myosin
- C) Actin
- D)  $\alpha$ -actinin

**54. Beetles have surface armour (exoskeleton) made of Chitin, which is**

- A) A homo polymer of N-acetyl D-glucosamine units in ( $\beta$ 1-4) linkage
- B) A homo polymer of D- glucose units in ( $\alpha$ 1-4) linkage
- C) A homo polymer of D-glucose units in ( $\beta$ 1-4) linkage
- D) A homo polymer of D-glucose units in ( $\alpha$ 1-6) linkage

**55. Splicing of introns occurs by**

- A) Dephosphorylation
- B) Phosphorylation
- C) Esterification
- D) Trans-esterification

**56. Selective degradation of Single stranded DNA is carried out by**

- A) Deoxyribonuclease
- B) Ribonuclease
- C) Nuclease
- D) S1 nuclease

**57. PCR technique is used for amplification of sample DNA. If a PCR reaction contains 100 molecules at the start of cycle, how many molecules will be present after 5 cycles?**

- A)  $32 \times 10^2$
- B)  $100 \times 10^5$
- C)  $64 \times 10^2$
- D)  $32 \times 10^3$

**58. Which one of the following statements about phosphofructokinase-I is false?**

- A) It is inhibited by citrate
- B) It is inhibited by ATP
- C) It is inhibited by AMP
- D) It is inhibited by PEP

**59. Transmembrane domains present in G- protein coupled receptors**

- A) 6
- B) 7
- C) 9
- D) 12





67. In order to kill the pathogens in the body, the immune cells produce superoxide anion radicals. One of the following is the enzyme involved in the formation of Superoxide anion radicals

- A) NADPH Oxidase
- B) Superoxide dismutase
- C) Se- GSH peroxidase
- D) Catalase

68. If the reaction mixture in a volume of 1mL, for the assay of rat liver lactate dehydrogenase activity, consists of 0.1 M Potassium Phosphate buffer pH 6.3, 10  $\mu$ M Sodium lactate, 5  $\mu$ M  $\text{NAD}^+$  and 15  $\mu$ g of the tissue homogenate, then quantity of sodium lactate present in the reaction mixture is

- A) 0.1 nano moles
- B) 1 nano mole
- C) 10 nano moles
- D) 100 nano moles

69. Linear energy transfer (LET) is a measure of rate at which radiation energy is imparted to the absorbing medium per unit distance of track length. Basing on this radiations are classified as "Low LET Radiations" and "High LET Radiations". One of the following radiations is not emitted by "High LET Radiations"

- A)  $\alpha$ -Particles
- B) X-rays
- C) Protons
- D) Neutrons

70. Which among the following is the heaviest particulate component of the cell?

- A) Cytoplasm
- B) Nucleus
- C) Mitochondria
- D) Golgi apparatus

71. The 5-HPETE extracted from the 5-lipoxygenase assay mixture showed an absorbance of 3 in a cuvette of path length of 1 cm at 235 nm. If the molar extinction co.efficient of 5-HPETE is 30,000 then the concentration of 5-HPETE in the cuvette is

- A) 100  $\mu$ M
- B) 10  $\mu$ M
- C) 1  $\mu$ M
- D) 0.1  $\mu$ M

72. The average pH of Urine is

- A) 8.0
- B) 7.0
- C) 6.0
- D) 0.0

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

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

74. The synthesis of glucose from pyruvate by gluconeogenesis

- A) Requires the participation of biotin
- B) Occurs exclusively in the cytosol
- C) Is inhibited by elevated level of insulin
- D) Requires oxidation/reduction of FAD

**75. A disaccharide linked by  $\alpha$ -1-4 glycosidic linkage is**

- |            |              |
|------------|--------------|
| A) Lactose | B) Sucrose   |
| C) Maltose | D) Cellulose |

**76. All the following are sulphur containing amino acids found in proteins EXCEPT**

- |               |              |
|---------------|--------------|
| A) Cysteine   | B) Cystine   |
| C) Methionine | D) Threonine |

**77. All active prostaglandins have at least one double bond between positions**

- |              |              |
|--------------|--------------|
| A) 7 and 8   | B) 10 and 11 |
| C) 13 and 14 | D) 16 and 17 |

**78. The transketolase enzyme in the pentose phosphate pathway requires which one of the following B vitamin.**

- |                   |                     |
|-------------------|---------------------|
| A) Riboflavin     | B) Thiamine         |
| C) Nicotinic acid | D) Pantothenic acid |

**79. In  $\beta$ -oxidation, 3-ketoacyl-CoA is split at the 2, 3 position by the enzyme:**

- |                           |   |
|---------------------------|---|
| A) Enoyl CoA-Hydratase    | B) $\beta$ -hydroxyacyl CoA dehydrogenase |
| C) Acyl CoA-Dehydrogenase | D) Acyl-CoA acetyltransferase             |

**80. The immunoglobulin possessing lowest concentration of carbohydrate is**

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