

Hall Ticket Number:

**ENTRANCE EXAMINATIONS – 2020**  
(Ph.D. Admissions - January 2021 Session)

**Y-71**

**PhD. Animal Biology**

**Time: 2 hours**

**Maximum Marks: 70**

**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.*
- *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 into consideration in case of a tie i.e., when more than one student gets equal marks, to prepare the merit list.*

**PART “A”**

1. At the pH of blood 7.4, the ratio between the carbonic acid and bicarbonate fractions is  
A) 1 : 10  
B) 1 : 20  
C) 1 : 30  
D) 1 : 40
2. Hyaluronic acid in artificial tears  
A) increases tear evaporation  
B) decreases tear stability  
C) aids in wound healing  
D) decreases tear viscosity
3. Which one of the following amino acids has pKa near neutrality?  
A) Tryptophan  
B) Histidine  
C) Arginine  
D) Asparagine

4. Electrophoretic separation at pH 6 of a sample containing polypeptide 1 (mw 100), polypeptide 2 (mw 200) and polypeptide 3 (mw 400) would result in which of the following? (Note: the isoelectric point of each polypeptide occurs at pH 6)
- A) None of the polypeptides would migrate  
 B) Polypeptide 3 would migrate the farthest  
 C) Polypeptide 2 would migrate the farthest  
 D) Polypeptide 1 would migrate the farthest
5. Which one of the following is not involved in Edman's degradation?
- A) Phenylisothiocyanate  
 B)  $\text{CF}_3\text{COOH}$   
 C) Dinitrofluorobenzene  
 D) Phenylthiocarbonyl
6. Which one of the following technique is used to determine the structure of a protein?
- A) Differential centrifugation  
 B) FPLC  
 C) Quantitative-PCR  
 D) NMR
7. Seliwanoff test is used to distinguish between
- A) Aldoses and ketoses  
 B) Reducing and non-reducing sugars  
 C) Pentoses and hexoses  
 D) Trioses and tetroses
8. Which one of the following holds true for Hydrogen bond?
- A) 10% covalent and 90% electrostatic  
 B) 1% covalent and 99% electrostatic  
 C) 5% covalent and 95% electrostatic  
 D) 9% covalent and 91% electrostatic
9. Which one of the following cannot be obtained from an X-ray crystallography study?
- A) Bond angle Si-O-Si in a mineral.  
 B) Absolute configuration of a chiral natural product  
 C) Degree of folding of a  $\text{Zn}_2\text{Cl}_2$  four-membered ring  
 D) Vibration frequency of a carbonyl group
10. Which one of the following antibiotic does not inhibit peptidoglycan biosynthesis?
- A) Penicillin  
 B) Tetracycline  
 C) Methicillin  
 D) Vancomycin
11. The number of bacteria cannot be determined by
- A) measuring absorbance at 600 nm  
 B) quantitative RT-PCR  
 C) Colony forming unit counting  
 D) two dimensional electrophoresis

12. Which one of the following techniques is not used to study changes in protein conformation?
- A) Circular dichroism                      B) Pulsed exchange 2D NMR  
C) FRET                                        D) q-PCR
13. In Lysine, the pKa of the side chain is about 10.5. Assuming that the pKa of the carboxyl and the amino groups are 2 and 9 respectively, the pI of lysine is closest to
- A) 5.5    B) 6.2  
C) 7.4    D) 9.8
14. Method by which the rate of transcription of genes on a global scale is
- A) RNA-Seq                                  B) GRO-Seq  
C) CLIP-Seq                                 D) CAP-Seq
15. Which one of the following tools can be used for next generation sequencing (NGS) sequence alignment against a reference genome?
- A) BWA                                        B) CLUSTALW  
C) BLAST                                     D) PHYLIP
16. In a 100 kb DNA fragment, how many recognition sites are possible for a restriction enzyme having six base pairs recognition sequence?
- A) 8    B) 80  
C) 800                                         D) 8000
17. Which one of the following isotope was used to label DNA while gathering a convincing proof on semiconservative mode of DNA replication?
- A) H<sup>3</sup>    B) C<sup>14</sup>  
C) N<sup>15</sup>                                         D) S<sup>35</sup>
18. Which one of the following vectors is not used for generation of genomic libraries?
- A) pUC1                                        B) BACs  
C) YACs                                        D) Cosmids
19. Which one of the following techniques is used to identify DNA sequence interacting with a protein?
- A) DNA finger printing                      B) Southern hybridization  
C) Western blotting                         D) DNA foot printing

20. DNA polymerase I of *E. coli* exhibits the following catalytic activities except
- A) 5' → 3' DNA-dependant DNA polymerase activity
  - B) 5' → 3' exonuclease activity
  - C) 3' → 5' exonuclease activity
  - D) 5' → 3' RNA-dependent DNA dependent
21. A numerical value that represents sample mean, is known as a
- A) population parameter
  - B) sample parameter
  - C) sample statistics
  - D) population mean
22. Human monoclonal antibodies can be obtained by
- A) immortalization of T cells using Epstein-Barr virus
  - B) fusing human B cells with mouse myeloma cells
  - C) using transgenic xenomouse strains
  - D) alteration of mouse monoclonal antibody
23. Antibody titer refers to the
- A) absolute amount of specific antibody.
  - B) affinity of specific antibody
  - C) concentration of specific antibody
  - D) highest dilution of antibody still able to give a positive result in a test system
24. Which one of the following symbol is the first character in a FASTA format of sequence files?
- A) <
  - B) >
  - C) +
  - D) -
25. Accumulation of lactate in animal cell culture media results in
- A) increase of pH and loss of cell viability
  - B) increase of pH and increased cell viability
  - C) decrease of pH and loss of cell viability
  - D) decrease of pH and increased cell viability
26. The middle value of an ordered array of numbers is known as
- A) Midpoint
  - B) Median
  - C) Mode
  - D) Mean
27. Dunn chamber is used to study cellular
- A) apoptosis
  - B) chemotaxis
  - C) proliferation
  - D) oxygen saturation

28. Which one of the following command can be used for a pattern search in files?
- A) Sed  
B) Grep  
C) Is  
D) Wc
29. The dye used in flow cytometry for assessment of mitochondrial membrane potential is
- A) H2-DCFDA  
B) DAPI  
C) Propidium Iodide  
D) Rhodamine
30. A radioactive sample has a half-life of 5 min. What fraction of the sample is left after 20 minutes?
- A) 1/2  
B) 1/4  
C) 1/8  
D) 1/16
31. In the two-component regulatory system, the sensor kinase and response regulator coordinate to regulate gene expression. Which one of the following is a sensor kinase?
- A) NtrC  
B) NtrA  
C) NifA  
D) NtrB
32. Triclosan is a chemical disinfectant that is derived from
- A) quaternary ammonium compounds  
B) Alcohols  
C) phenols  
D) Aldehydes
33. Antibody-based tests for disease diagnosis can be done by the following tests, except
- A) delayed skin hypersensitivity reaction  
B) ELISA  
C) Western blotting  
D) agglutination
34. COVID-19 test is based on
- A) centrifugation  
B) Electrophoresis  
C) polymerase chain reaction  
D) high speed filtration
35. Which one of the transcription factors act both as transcription activator and repressor?
- A) AraC  
B) AraD  
C) LacI  
D) LacA

## PART "B"

36. Cytochalasin B was added just before mitosis begins in mammalian cells. The possible effect could be
- |  |  |
|--|--|
| A) arrest at mitotic prophase itself                     | B) complete mitosis and arrest at cytokinesis        |
| C) cell division completes to divide into daughter cells | D) arrest at mitotic anaphase causing nondisjunction |
37. Which of the following has four base pairs long recognition sequence?
- |                 |                  |
|-----------------|------------------|
| A) <i>Sau3A</i> | B) <i>BamH1</i>  |
| C) <i>NotI</i>  | D) <i>BglIII</i> |
38. One of the organisms below require enriched chocolate agar medium for culturing
- |                                    |                                  |
|------------------------------------|----------------------------------|
| A) <i>Staphylococcus aureus</i>    | B) <i>Pseudomonas aeruginosa</i> |
| C) <i>Streptococcus pneumoniae</i> | D) <i>Escherichia coli</i>       |
39. When there is a single flagellum present at each end of a bacterium, it is referred as
- |                  |                  |
|------------------|------------------|
| A) Lophotrichous | B) Monotrichous  |
| C) Petritrichous | D) Amphitrichous |
40. Which of the following is not a chromosome instability syndrome?
- |                          |                         |
|--------------------------|-------------------------|
| A) Bloom syndrome        | B) Klinefelter syndrome |
| C) Ataxia telangiectasia | D) Fanconi anaemia      |
41. Breast cancer is triple negative if it
- |   |   |
|---|---|
| A) lacks estrogen receptors, progesterone and HER2 protein receptor | B) lacks estrogen receptors, progesterone receptors and HER2 protein receptor |
| C) lacks estrogen, progesterone receptors and HER2 protein          | D) lacks Estrogen receptors, progesterone receptors and HER2 protein          |
42. Which one of the following are not involved in antigen presenting?
- |                                       |                     |
|---------------------------------------|---------------------|
| A) CD11C <sup>+</sup> dendritic cells | B) Follicular cells |
| C) B cells                            | D) Macrophages      |
43. During cloning of a gene into a plasmid vector, self-ligation of the vector occurs that reduces the number of recombinants produced. This can be prevented by
- |                                       |                                       |
|---------------------------------------|---------------------------------------|
| A) dephosphorylation to generate 5'OH | B) dephosphorylation to generate 3'OH |
|---------------------------------------|---------------------------------------|

- C) phosphorylation of 3'OH                      D) phosphorylation of both 5'OH and 3'OH
44. Receptor for Corona virus is
- A) ACE2    B) EGFR1  
C) ILR2    D) TAS2
45. Animal cells can be cryopreserved, but not plant cells, because
- A) plant cells differentiate rapidly under cryopreservation                      B) plant cells contain chloroplasts that can be denatured at very low temperatures  
C) animal cells do not contain water-filled vacuoles that can form ice                      D) the biological reaction of plant cells cannot be stopped by cryopreservation
46. IgG treatment with the proteolytic enzyme Pepsin results in production of
- A) Fab fragments                                      B) Fc fragment  
C) Fab and Fc fragment                              D) F(ab')<sub>2</sub> fragment
47. Terminal transferase is an enzyme used in genetic engineering. It catalyses the addition of
- A) deoxynucleotide to the 3' OH end of DNA                      B) phosphate moiety to the 3' OH end of DNA  
C) phosphate moiety to the 5' OH end of DNA                      D) deoxynucleotide to the 5' OH end of DNA
48. In the binding of oxygen to myoglobin, the relationship between the concentration of oxygen and the fraction of binding sites occupied can best be described graphically as
- A) sigmoidal    B) hyperbolic  
C) linear with positive slope                              D) linear with negative slope
49. Which one of the following statement is true with reference to organization of mammalian hypothalamo-hypophyseal portal system?
- A) Median eminence is connected by hypothalamic portal blood vessels that pass through pars tuberalis to pars distalis                      B) Median eminence is connected by hypothalamic portal blood vessels that pass through pars intermedia to pars distalis  
C) Median eminence is connected by hypothalamic portal blood vessels that pass through pars tuberalis to pars nervosa                      D) Median eminence is connected by hypothalamic portal blood vessels that pass through pars nervosa to pars distalis

50. With reference to base cross-linking, which one of the following statements is false?

- A) Base cross-linking means that covalent bonds form between two bases
- B) The anti-cancer agent cisplatin causes a type of cross-linking between two guanine residues
- C) Pyrimidine dimers are a type of base cross-linking that is commonly induced by excess exposure to sunlight
- D) The cross-linked bases are on opposing DNA strands

51. Solenocyte and flame cells are components of the system involved in

- A) excretion
- B) photoreception
- C) Respiration
- D) chemoreception

52. B cells are distinguished from T cells by the presence of

- A) CD3
- B) CD19
- C) Class II MHC antigen
- D) Both B and C

53. TNM in tumour staging is indicative of

- A) tumour size, lymph nodes, metastasis
- B) tumour type, neoplasia, megaloblastic
- C) tumour type, lymph nodes, metastasis
- D) tumour size, neoplasia, megaloblastic

54. The portion of the blastoderm-stage embryo which will give rise to most of ectodermal, mesodermal and endodermal tissues in *Drosophila* is

- A) ventral
- B) germ band
- C) imaginal discs
- D) amnioserosa

55. Core regulatory circuitry in embryonic stem cells refers to

- A) binding of OCT4, NANOG and SOX2 to regulatory elements of only active genes
- B) binding of OCT4, NANOG and SOX2 to regulatory elements of both active and silent genes
- C) binding of OCT4, NANOG and SOX2 to their own as well as active and silent gene regulatory elements
- D) microRNA regulation of OCT4, NANOG and SOX2 gene transcripts during Embryonic stem cell self-renewal

56. If the pancreatic duct is obstructed, elevated levels of \_\_\_\_\_ are observed

- A) Amylase
- B) Bilirubin
- C) Secretin
- D) Cholecystokinin



57. Carnitine palmitoyl transferase I (CPTI) is responsible for carrying

- A) ketone bodies into mitochondria
- B) long chain fatty acids into mitochondria
- C) acetyl groups out of mitochondria
- D) malonyl CoA out of mitochondria

58. Toxic shock is caused by

- A) toxins produced from bacteria
- B) excessive stimulation of a large proportion of T-cells by bacterial superantigens
- C) abnormal cytokine production from B cells
- D) excessive production of immunoglobulins

59. Chemical signals released by an organism that influences the behavior of other individuals of the same species are

- A) Pheromones
- B) Androgens
- C) Magainins
- D) Defensins

60. Which one of the following directly inhibits prolactin release in mammals?

- A) Epinephrine
- B) Dopamine
- C) TRH
- D) CRH

61. In Amphibians, during gastrulation the formation of bottle cells at blastopore lip is mediated by activation of

- A) *Xnr1*
- B) *Cerberus*
- C) *Bmp4*
- D) *Xwnt8*

62. Which one of the following is incorrect with reference to pregnancy and lactation?

- A) Galactopoiesis requires stimulation by prolactin with normal levels of insulin, cortisol and thyroid hormone
- B) During the third trimester of pregnancy, the prolactin level may reach 200 to 300ng/mL. It then gradually elevates during the first month of postpartum, due to continued lactation
- C) Amenorrhea is normal during pregnancy and lactation and it cessates with escape of gonadotropins, initially by FSH
- D) Galactorrhea (discharge of milk) is not associated with pregnancy or lactation

63. The causative agent of syphilis is

- A) *Treponema pallidum*
- B) *Haemophilus ducreyi*
- C) *Chlamydia trachomatis*
- D) *Ureaplasma urealyticum*

64. The neurotransmitter involved in inhibitory synaptic transmission is
- A) Acetylcholine
  - B) Glutamate
  - C) GABA
  - D) Noradrenaline
65. In mammals, critical amino acid signature domain of kisspeptin is
- A) YNWNSFGLR
  - B) YNLNSFGLF
  - C) YNLWSFGLF
  - D) YWLNSFGLF
66. What is the order of following five events during embryonic stem cell differentiation?
- (I) Asymmetric cell division
  - (II) Differential replication timing
  - (III) Induction of early response genes
  - (IV) Reorganization of genes between nuclear periphery and nuclear interior
  - (V) Hypo dynamic state of chromatin
- A) III, II, I, IV and V
  - B) I, II, V, III and IV
  - C) II, I, IV, III and V
  - D) III, V, I, II and IV
67. Which cytokine is necessary for development of both early B and early T cells?
- A) IL-2
  - B) IL-17
  - C) IL-7
  - D) IL-4
68. Chylomicrons are also referred as
- A) VLDL
  - B) ULDL
  - C) LDL
  - D) HDL
69. Which one of the following processes is most affected by the damage to hippocampus?
- A) decision making
  - B) Hearing
  - C) memory
  - D) smell and taste
70. Insulin receptor is a member of which class of receptor tyrosine kinase (RTK) superfamily?
- A) RTK Class I
  - B) RTK Class II
  - C) RTK Class III
  - D) RTK Class IV

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For rough work:

**PhD ANIMAL BIOLOGY 2020**

1	B	36	B
2	C	37	A
3	B	38	C
4	A	39	D
5	C	40	B
6	D	41	D
7	A	42	B
8	A	43	A
9	D	44	A
10	B	45	C
11	D	46	D
12	D	47	A
13	D	48	B
14	B	49	A
15	A	50	D
16	A	51	A
17	C	52	D
18	A	53	A
19	D	54	C
20	D	55	C
21	C	56	A
22	C	57	B
23	D	58	B
24	B	59	A
25	C	60	B
26	B	61	A
27	B	62	B
28	B	63	A
29	D	64	C
30	D	65	A
31	D	66	C
32	C	67	C
33	A	68	B
34	C	69	C
35	A	70	B

*A*  
28/1/2021