

Hall Ticket Number:

C-13

ENTRANCE EXAMINATION - June 2023

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 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.*

PART "A"

1. Which one of the following is a biodegradable polymer?
A) Nylon-6,6
B) Nylon-6
C) Nylon-2-nylon-6
D) Buna-S

2. A mixture of proteins namely P, Q, R and S having molecular mass 50, 80, 120, and 150 kDa respectively were applied onto a sephadex-G-200 column. The order of their elution will be
A) P, Q, R, S
B) S, R, Q, P
C) Q, P, R, S
D) P, Q, S, R

3. The catalytic beta-subunit of central core of 20S proteasome is targeted by
A) penicillin
B) lactacystin
C) streptomycin
D) kanamycin

4. Which one of the following statements is true?
- A) Threonine has two chiral carbons; therefore, four stereoisomers are possible
- B) Threonine has three chiral carbons; therefore, six stereoisomers are possible
- C) Threonine has one chiral carbon; therefore, two stereoisomers are possible
- D) Threonine has no chiral carbons; therefore, no stereoisomers are possible
5. The mole fraction of glucose in a solution having a molarity of 2.315 Mol/L is
- A) 0.05
- B) 0.04
- C) 0.03
- D) 0.02
6. Which one of the following DNA molecules moves faster in agarose gel electrophoresis?
- A) 4 kb linear duplex DNA
- B) 4 kb circular duplex DNA
- C) 4 kb circular supercoiled DNA
- D) 4 kb linear single stranded DNA
7. In statistical analyses, which one of the following statements is true about the mean, median and mode of a normal distribution?
- A) The mean is always greater than the median and mode
- B) The median is always greater than the mean and mode
- C) The mode is always greater than the mean and median
- D) The mean, median and mode are all equal
8. Resolving power of a microscope depends on the
- A) wavelength only
- B) numerical aperture only
- C) refractive index only
- D) numerical aperture and wavelength
9. An adjuvant that contains killed *Mycobacterium* component is
- A) MF59
- B) Freund's incomplete
- C) Freund's complete
- D) RC529
10. A novel type-II restriction endonuclease isolated from a thermophilic bacterium recognizes the sequence - 5'ATAANNNTTAT 3' (N denotes any nucleotide) and cleaves it after the third base (A) starting from the 5'. The resulting nucleotide sequence after digestion will be
- A) a three nucleotide long 5' overhang
- B) a seven nucleotide long 5' overhang
- C) a four nucleotide long 5' overhang
- D) a three nucleotide long 3' overhang

18. Which one of the following techniques allows the quantitative determination of the number of antigen-specific T cells in a given population?

- A) Indirect ELISA
- B) Sandwich ELISA
- C) Competitive ELISA
- D) ELISPOT

19. Which one of the following inhibits protein synthesis in both bacteria and eukaryotes?

- A) Actinomycin D
- B) Cycloheximide
- C) Tetracycline
- D) Chloramphenicol

20. To promote the attachment and spreading of anchorage-dependent animal cells, the surface of the culture vessels needs to be coated with

- A) fibrin
- B) collagen
- C) pronase
- D) vimentin

21. Which one of the following types of chromatographic techniques will be the most appropriate to separate dCTP from a mixture of dCTP, dCDP, dCMP?

- A) Anion exchange
- B) Cation exchange
- C) Gel filtration
- D) Hydrophobic interaction

22. If the weight of a bioproduct is 113 kilograms and the impurities in it are 500 grams, the purity of the bioproduct will be

- A) 99.12 %
- B) 99.56 %
- C) 0.004 %
- D) 99.68 %

23. Which one of the following is used for the enrichment of Uranium?

- A) Tubular centrifuge
- B) Disk-stack centrifuge
- C) Gas centrifuge
- D) Zippe-type centrifuge

24. Which one of the following is not a correct statement?

- A) Yeast two-hybrid screening is based on reconstitution of transcription factor fragments fused with two proteins whose interactions need to be studied
- B) In forward genetics, phenotype analysis precedes genotype analysis
- C) Reverse genetics is an approach of generating mutants by targeting defined genes
- D) In the interpretation of gene expression analysis, high Ct values are suggestive of mRNA abundance

25. Schaeffer Fulton method is an endospore staining technique that uses _____ stain.

- A) carmine
 B) malachite green
 C) acridine orange
 D) haematoxylin

26. A patient with breast cancer was given a dose of radiation along with chemotherapy and was apparently cured of the tumor. After five years, a tumor was noticed in the patient's lungs, but the doctors confirmed that it was derived from cells of the mammary gland. The following possibilities were suggested by the doctor. Which of the following is correct?

- A) Bacterial infection, after radiation, led to development of the tumors in the lungs.
 B) Migration of residual chemo-resistant cells from the mammary gland resulted in tumors in the lungs.
 C) Epithelial-to-mesenchymal transition had occurred in the lungs.
 D) Cells in the lungs were induced to become a tumor after chemotherapy and from factors secreted by mammary cells.

27. Choose the appropriate ion exchange chromatography matrix to separate the peptide (GLEKSLVRLGDVQPSLGKESRAKKFQRQ) from a mixture of peptides at pH 7.0,

- A) Diethylaminopropyl
 B) Diethylaminoethyl
 C) Carboxymethyl
 D) Quaternary amine

28. One of the following statements is incorrect

- A) Enhancers produce RNA
 B) Promoters produce RNA
 C) Exons produce RNA
 D) Introns produce RNA

29. Treatment of IgG with pepsin results in production of

- A) Fab fragment only
 B) Fc fragment only
 C) Fab and Fc fragment
 D) F(ab')₂ fragment and Fc fragment

30. Which one of the following is the latest human reference genome?

- A) mm39
 B) hg19
 C) hg38
 D) mm10

31. Fluorescence microscopy that requires photoactivatable probes to obtain super-resolution is

- A) Structured Illumination Microscopy
 B) dStochastic Optical Reconstruction Microscopy
 C) Stimulated Emission Depletion Microscopy
 D) Laser Scanning Confocal Microscopy

47. Which one of the following is not an expected pattern in autosomal dominant inheritance?
- A) An affected person mating with an unaffected person should produce approximately 50% affected offspring
 B) The distribution of trait among sexes should be almost equal
 C) Trait often skips generations
 D) Transmitted by either sex
48. The tyrosine kinase inhibitor used for the treatment of leukemia is
- A) imatinib
 B) prednasalone
 C) nelarabine
 D) oncaspar
49. What is a syngeneic graft?
- A) A graft from the same individual
 B) A graft from genetically different background of same species
 C) A graft between genetically identical background of same species
 D) A graft between members of two different genetic species
50. An enzyme catalyzed reaction has a K_m of 1 mM and V_{max} of 5 nM/s. What is the reaction velocity when the substrate concentration is 0.25 mM?
- A) 1 nM/s
 B) 10 nM/s
 C) 1 mM/s
 D) 10 mM/s
51. Which nucleotide in the intron sequences is critical in lariat formation during splicing?
- A) Uracil
 B) Cytosine
 C) Guanine
 D) Adenine
52. Cortisol is produced in _____ region of the adrenal gland
- A) zona glomerulosa
 B) zona reticularis
 C) zona fasciculata
 D) medullary region
53. Calcineurin is a
- A) serine/threonine protein phosphatase
 B) Ca^{2+} dependent protease
 C) serine/threonine protein kinase
 D) Ca^{2+} dependent kinase
54. Which of the interactions between T cells and APCs would lead to anergy?
- A) B7.1-CD28
 B) B7.2-CD28
 C) B7-CTLA4
 D) CD86-CD28

55. The number of ammonia and CO₂ molecules used in one urea cycle respectively are
- A) 2 and 1
B) 2 and 2
C) 2 and 3
D) 1 and 2
56. Hypopnea is characterized by
- A) partial obstruction of airways
B) collapse of alveolar structure
C) inability of lungs to eliminate excess carbondioxide
D) abnormally low levels of oxygen in blood
57. With reference to survival strategies, one of the following intracellular bacteria prevents phagolysosome fusion
- A) *Listeria monocytogenes*
B) *Rickettsia rickettsii*
C) *Mycobacterium tuberculosis*
D) *Shigella flexneri*
58. In the receiving neurons, receptors for neurotransmitters are found on
- A) dendrites
B) axons
C) synaptic vesicles
D) pre-synaptic compartment
59. Androgen Insensitivity Syndrome in humans is a result of the defects in _____ chromosome
- A) 21
B) X
C) Y
D) 18
60. A calcium binding protein involved in visual phototransduction is
- A) calmodulin
B) calretinin
C) parvalbumin
D) recoverin
61. Which one of the following vitamins is considered as a hormone?
- A) Vitamin D
B) Vitamin C
C) Vitamin E
D) Vitamin K
62. Sabin-Feldman test is used to detect the presence of *Toxoplasma*. One of the following is not a correct statement with regard to this test
- A) The test uses *Toxoplasma* specific antibodies, complement proteins and methylene blue dye
B) The detection of parasite in this test indicates "no infection"
C) The detection of parasite in this test indicates "presence of infection"
D) The complement proteins in this test are mediators for *Toxoplasma* lysis

63. Who was awarded the Nobel prize for the discovery of induced pluripotent stem cell (iPSC) technology?

- A) Dr. Shinya
- B) Dr. Kornberg
- C) Dr. Ian Wilmut
- D) Dr. JBS Haldane

64. What is the relationship between dorsoventral patterning of the neural tube and patterning of the somites?

- A) The somites pattern the neural tube after they form
- B) The neural tube plays the role of organizer in being the sole influence on patterning in the somites
- C) Sonic hedgehog from the notochord and floor plate of the neural tube confers ventral fates on both the neural tube and the somite, while bone morphogenic proteins confer more dorsal fates
- D) Both the neural tube and the somites acquire their dorsoventral patterning during gastrulation.

65. Which one of the following animals has ZZ and ZW sex determination system?

- A) Bat
- B) Crocodile
- C) Chicken
- D) Platypus

66. During gastrulation, mammalian and bird hypoblast formation involves

- A) ingression
- B) epiboly
- C) delamination
- D) involution

67. Which one of the following cells has the shortest S phase of cell cycle?

- A) Neuron
- B) Cardiac stem cells
- C) Hematopoietic stem cell
- D) Embryonic stem cell

68. Presence of which of the following conditions in urine are indicative of diabetes mellitus?

- A) Ketonuria and glycosuria
- B) Renal calculi and hyperglycemia
- C) Uremia and ketonuria
- D) Uremia and renal calculi

69. *Wuchereria bancrofti* sheath antigen can activate

- A) TLR3
- B) TLR2
- C) TLR4
- D) TLR9

70. Loss of balance, coordination and decreased muscle tone are associated with the damage in

- A) upper motor neurons
 - B) occipital lobe
 - C) thalamus optics
 - D) cerebellar region
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For Rough Work

University of Hyderabad
Ph.D. Entrance Examinations - 2023

School/Department/Centre: School of Life Sciences, Department of Animal Biology

Course: Ph.D.

Subject : Animal Biology

Q.No	ANSWER	Q.No.	ANSWER
1	C	36	C
2	B	37	A
3	B	38	A
4	A	39	C
5	B	40	A
6	C	41	D
7	D	42	D
8	D	43	A
9	C	44	D
10	B	45	B
11	C	46	B
12	D	47	C
13	A	48	A
14	A	49	C
15	A	50	A
16	A	51	D
17	B	52	C
18	D	53	A
19	A	54	C
20	B	55	A
21	A	56	A
22	B	57	C
23	C	58	A
24	D	59	B
25	B	60	D
26	B	61	A
27	C	62	C
28	B	63	A
29	D	64	C
30	C	65	C
31	B	66	C
32	D	67	D
33	D	68	A
34	C	69	C
35	D	70	D

Note/Remarks :

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Signature 26/6/2023

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