

**ENTRANCE EXAMINATION, May 2019
Ph.D. Animal Biology**

Hall Ticket Number:

Maximum 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 to the invigilator 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 12 (TWELVE) pages in this question paper. Check this before you start answering. Answer sheet (OMR) will be provided separately.*
- *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 candidate gets equal marks, to prepare the merit list.*

PART "A"

1. Which of the following will migrate faster when electrophoresed on an agarose gel, provided that the amount present in each of them is equal?

- A) Linear DNA
- B) Supercoiled DNA
- C) Relaxed circular DNA
- D) Nicked DNA

2. The average molecular weight of an amino acid residue in a protein is about:

- A) 330
- B) 220
- C) 110
- D) 440

3. Ultracentrifugation is required for the isolation of the following except:

- A) microsomes
- B) lysosomes
- C) mitochondria
- D) nucleus

4. Monochromatic light is used to increase the resolution of light microscopes. Which of the following colored light would give the best resolution?

- A) Red
 B) Orange
 C) Green
 D) Blue

5. First biosensor invented for glucose measurement evolved further to modern day portable sensors by using the principle of:

- A) Electrochemistry
 B) Optics
 C) Immunology
 D) Solid state physics

6. The pH of a solution whose $[\text{OH}^-]$ is $9.31 \times 10^{-2} \text{ M}$ is:

- A) 12.97
 B) 1.03
 C) 1.07
 D) 10.44

7. Which one of the following is added to enhance the color development in Lowry's method for protein estimation?

- A) Adam's reagent
 B) Furukawa's reagent
 C) Lemieux-Johnson reagent
 D) Folin-Ciocalteu reagent

8. The least water soluble biomolecule among the following is:

- A) Palmitic acid
 B) Oxaloacetic acid
 C) Sucrose
 D) Ethanol

9. Chromosome painting to analyze karyotyping in humans involves:

- A) inherent fluorescence of A-T base pairs
 B) restriction digestion followed by nick translation with fluorescent nucleotides
 C) specific hybridization with fluorescent probes
 D) inherent fluorescence of G-C base pairs

10. Multiple amplicons of varying sizes, including the desired amplicon of expected size, were observed in a polymerase chain reaction, wherein the template was human genomic DNA. Which one of the following modifications will most likely eliminate the undesired amplicons?

- A) Increasing the denaturing temperature from 94°C to 96°C
 B) Decreasing the elongation time from 5 minutes to 1 minute
 C) Decreasing the number of cycles from 35 to 25
 D) Increasing the annealing temperature from 54°C to 56°C

11. 50 μl of [^{14}C] labelled sample having a given dpm (disintegrations per minute) is added to 10 ml of scintillation cocktail. Provided the cpm (counts per minute) is 15,200 with an efficiency of 0.92, what was the dpm added?

- A) 21,000
B) 13,984
C) 16,522
D) 15,200

12. cDNA is:

- A) Complimentary DNA produced using an mRNA template
B) Complimentary DNA produced using an RNA template
C) Complimentary DNA produced using a cDNA template
D) Complimentary DNA produced using DNA template

13. The substrate used for alkaline phosphatase based color development in ELISA is:

- A) BCPIP / NBT
B) X-gal
C) pNPP
D) Dimethyl benzidine & H_2O_2

14. In statistical analyses, the "degrees of freedom" is equal to the number of observations:

- A) minus one
B) plus one
C) multiplied by ten
D) to the power of ten

15. Insulin A and B fragments are independently expressed as fusion proteins with β -galactosidase at the N-terminus. If methionine is at the junction of the fusion protein, which of the following is used to remove β -galactosidase from insulin A & B fragments?

- A) Trypsin digestion
B) Pepsin digestion
C) Amylase digestion
D) Cyanogen bromide treatment

16. Monoclonal antibodies are produced by _____ technology.

- A) hybridization
B) mass culture
C) hybridoma
D) recombinant DNA

17. Which one of the following is equal to the pK_a for a weak acid?

- A) Its relative molecular mass
B) The pK_b of its conjugate base
C) The pH of a solution containing equal amounts of the acid and its conjugate base
D) The equilibrium concentration of its conjugate base

18. The hydrophobic nature of interaction of a protein-nucleic acid complex can be verified if the complex is disassociated by:

- A) Protease treatment
- B) high salt
- C) nuclease treatment
- D) organic solvent

19. Restriction enzymes are named for:

- A) the place in which they were discovered
- B) the scientist who discovered
- C) the bacterium they are derived from
- D) the viral DNA they attack

20. If the Gamma (γ) [P^{32}] labelled nucleotides are used in *in vitro* transcription assay, the nascent transcript is:

- A) unlabeled
- B) labelled
- C) labelled, but the amount of radioactivity increases with the size of transcript
- D) labelled, but the amount of radioactivity remains constant irrespective of the size of transcript

21. The body weights (in kg) of five individuals are 116, 168, 124, 132 and 110. The "sample median" is:

- A) 144
- B) 114
- C) 124
- D) 134

22. Specimens are exposed to ultraviolet light for visualization and presentation of images with the resulting light emitted at a different wavelength. This is a hall mark of _____ microscopy:

- A) Fluorescence
- B) Phase-contrast
- C) Dark-field
- D) Transmission

23. Isolation of a pure bacterial culture refers to:

- A) purification of a culture
- B) introduction of inoculum
- C) separation of a single colony
- D) purifying cells of same size

24. In order to insert a foreign gene into a plasmid, both must:

- A) have the same number of base pairs
- B) be cut using the same set of restriction enzymes
- C) have identical sequences
- D) be complementary to each other

25. Which of the *E. coli* strains is commonly used for the expression of a gene which is cloned under T7 promoter?

- A) *E. coli* DH5a
B) *E. coli* HB101
C) *E. coli* K12
D) *E. coli* BL21

26. Hidden Markov Model is a probabilistic model used for:

- A) pairwise alignment of a sequence
B) making parsimonious phylogenetic tree
C) eukaryotic gene structure prediction
D) secondary structure prediction of non-coding RNA

27. An expression vector does not contain:

- A) origin of replication
B) DNA segments for regulation of mRNA translation
C) antibiotic resistance gene
D) inverted repeats

28. Which of the following is a primary stain for acid fast staining of mycobacteria?

- A) Carbol fuchsin
B) Crystal violet
C) Giemsa
D) Methylene blue

29. Embryonic stem cells are considered to be advantageous in animal transgenesis since they:

- A) are immortal
B) can be maintained for longer durations
C) allow manipulations for gene transfer
D) are easy to isolate

30. In the equation $n=2.3(\log_{10} N - \log_{10} N_0)$ used for calculating bacterial growth, "n" stands for:

- A) total population
B) initial population
C) growth constant
D) number of generations

31. Mature B cells can be isolated from the blood by flow cytometry using fluorescence tag labelled antibodies raised against:

- A) CD25
B) CD4
C) CD8
D) CD19

32. A mammalian cell culture with a density of 3.7×10^6 cells/ml was diluted in the ratio of 1:37. 100 μ l of the diluted culture was seeded into each well of a 96 well culture plate. The cell density per well is:

- A) 1×10^5 B) 3.7×10^4
C) 3.7×10^5 D) 1.0×10^4

33. In order to provide reliability to the branches in a phylogenetic tree of related nucleotide / amino acid sequences, one should consider:

- A) having large number of input sequences B) repeated sampling of aligned columns from original data
C) use consensus tree from multiple methods/software D) branch strength test

34. What is the correct order of staining reagents in Gram-Staining?

- A) Crystal violet, alcohol, iodine solution, safranin B) Iodine solution, crystal violet, alcohol, safranin
C) Crystal violet, iodine solution, alcohol, safranin D) Crystal violet, safranin, alcohol, iodine solution

35. A solution containing 40 ppm of a compound had an absorbance of 0.425 in a 1 cm cell at 690 nm. If 5 mL of this solution was diluted with water to 100 mL, what will be the absorbance of the diluted solution at 690 nm?

- A) 0.0021 B) 0.210
C) 2.01 D) 0.021

PART- B

36. Which among the following are pro-apoptotic

- A) BAX and BCL-2
- B) BID and BCL-2
- C) BID and BAX
- D) BCL-XL and BID

37. Which of the following is an immune privileged site in the human body?

- A) Lymph nodes
- B) Cornea
- C) Skin
- D) Lungs

38. Species inhabiting different geographical areas are called:

- A) Allopatric
- B) Peripatric
- C) Sympatric
- D) Parapatric

39. The relation between K_m and K_d in an enzyme catalyzed reaction is:

- A) K_m is usually less than K_d
- B) K_m is usually more than K_d
- C) K_m is always equal to K_d
- D) K_m and K_d are independent of each other

40. At times, the gene that is cloned is not well known for the protein encoded by it. In order to assess the function, the endogenous gene in the mutant strain is inactivated. This approach is called as:

- A) Reverse genetics
- B) Forward genetics
- C) Genetic foot printing
- D) Genetic mapping

41. Which of the following promoters depends on cyclic AMP-CRP complex for transcription activation?

- A) pLac
- B) pTac
- C) pLacUV5
- D) pT7

42. The cleavage pattern seen in fertilized eggs of echinoderms is:

- A) radial and holoblastic
- B) radial and meroblastic
- C) spiral and holoblastic
- D) spiral and discoidal

43. Hyper-IgM syndrome is characterized by mutation in:

- A) CD40 gene
- B) CD19 gene
- C) B7 gene
- D) CD28 gene

44. Methicillin inhibits bacterial cell-wall biosynthesis by inhibiting the biosynthesis of:

- A) lipopolysaccharide B) cellulose
C) peptidoglycan D) proteins

45. Which of the following sigma factors is responsible for activation of nitrogen fixation genes?

- A) σ^{32} B) σ^{54}
C) σ^{70} D) σ^S

46. Evolutionary convergence is characterized by:

- A) Development of dissimilar characteristics in closely related groups B) Development of a common set of characteristics in the groups of different ancestry
C) Development of characteristics by random mating D) Replacement of common characteristics in different groups

47. Which of the following mesoderm gives rise to the dermis of skin?

- A) Intermediate B) Lateral splanchnic
C) Lateral somatic D) Paraxial

48. Temperature dependent sex determination is commonly seen in:

- A) fishes and turtles B) fishes and birds
C) fishes and mammals D) birds and mammals

49. Analogous structures are characterized by:

- A) Similarities in appearance and function B) similarities in appearance but differences in functions
C) similarities in organ structure D) similarities in cellular make up

50. Major histocompatibility complex proteins are presented on cell surface:

- A) constitutively B) in response to stress
C) during apoptosis D) only when infected

51. Riboswitch is involved in:

- A) transcriptional regulation B) translational regulation
C) post translational regulational D) post transcriptional regulation

52. The brain vesicle which gives rise to optic vesicles, retina and hypothalamic regions of the brain is:
- A) telencephalon
B) diencephalon
C) metencephalon
D) myelencephalon
53. The envelope surrounding the nucleocapsid of animal viruses is made up of:
- A) lipoproteins
B) polysaccharides
C) peptidoglycan
D) chitin
54. The phosphorylated form of E-II (EII-P):
- A) activates adenylate cyclase
B) inhibits adenylate cyclase
C) inhibits permease
D) inactivates HPr protein
55. Which of the following are the larval forms seen in Crustacea:
- A) Bipinnaria, Brachiolaria and Doliolaria
B) Uiracidium, Cercaria and Onchomiracidium
C) Trochophore, Actinula and Cyphonautes
D) Nauplius, Zoaea and Megalopa
56. Bacteria utilize glucose preferentially over other sugars through:
- A) catabolite induction
B) enzyme induction
C) operon repression
D) catabolite repression
57. Melatonin is secreted by:
- A) melanocytes
B) pinealocytes
C) chondrocytes
D) hepatocytes
58. Klenow enzyme possesses:
- A) 5'3' polymerase, 5'3' exonuclease and 3'5' exonuclease activities
B) 5'3' polymerase and 5'3' exonuclease activity
C) 5'3' polymerase and 3'5' exonuclease activity
D) 5'3' polymerase and endonuclease activity
59. Anterior morphogen critical for establishing antero-posterior polarity during *Drosophila* embryonic development is:
- A) Bicoid
B) Nanos
C) Torso
D) Torpedo

60. For any particular trait, the pair of alleles of each parent separate and only one allele from each parent passes to an offspring is Mendel's principle of:

- A) inheritance
- B) segregation
- C) hybridization
- D) independent assortment

61. The correct order of the secretory pathway for proteins in a mammalian cell is:

- A) Smooth ER → Golgi transport vesicle → Golgi cisternae → secretory vesicle → cell surface
- B) Golgi cisternae → ER transport vesicle → smooth ER → secretory vesicle → cell surface
- C) Rough ER → Golgi transport vesicle → Golgi cisternae → secretory vesicle → cell surface
- D) Golgi cisternae → ER transport vesicle → smooth ER → secretory vesicle → cell surface

62. The conjugating agent that participates in the conversion of phenyl alanine to tyrosine in phenylketonuria is:

- A) glutathione
- B) glutamine
- C) proline
- D) leucine

63. the enzyme that methylates to convert norepinephrine to epinephrine is absolutely dependent on:

- A) adrenal mineralocorticoids and ACTH
- B) adrenal glucocorticoids and ACTH
- C) corticotrophin releasing hormone and dopamine
- D) ACTH and renin-angiotensin

64. Dental formula seen in adult human is:

- A) $\frac{3, 1, 4, 2}{3, 1, 4, 3}$
- B) $\frac{2, 1, 2, 3}{2, 1, 2, 3}$
- C) $\frac{2, 1, 3, 2}{2, 1, 3, 2}$
- D) $\frac{3, 1, 3, 1}{3, 1, 2, 1}$

65. Prostaglandins are rapidly metabolized to their inactive products in:

- A) lungs
- B) stomach
- C) pancreas
- D) kidney

66. Which of the following is absolutely essential for fertility in mice?

- A) Seminal vesicles
- B) Prostate
- C) Bulbourethral glands
- D) Coagulating glands

67. Lewy bodies are found in:

- A) kidneys
- B) lungs
- C) brain
- D) testes

68. Which of the following cell type is not derived from neural crest cells during mammalian development?

- A) Melanocytes
- B) Schwann cells
- C) Chromaffin cells
- D) Blood cells

69. Structural component of HIV required for cell-cell fusion is:

- A) P24
- B) GP41
- C) GP120
- D) P32

70. In a Robertsonian translocation, fusion occurs at:

- A) telomeres
- B) ends of long arms
- C) short arms
- D) centromeres

For rough work

University of Hyderabad

Entrance Examinations - 2019

School/Department/Centre : ANIMAL BIOLOGY

Course/Subject : PhD ANIMAL BIOLOGY

Q.No.	Answer	Q.No.	Answer	Q.No.	Answer	Q.No.	Answer
1	B	26	C	51	D	76	
2	C	27	D	52	B	77	
3	D	28	A	53	A	78	
4	D	29	C	54	A	79	
5	A	30	D	55	D	80	
6	A	31	D	56	C	81	
7	D	32	D	57	B	82	
8	A	33	B	58	C	83	
9	C	34	C	59	A	84	
10	D	35	D	60	B	85	
11	C	36	C	61	C	86	
12	A	37	B	62	B	87	
13	C	38	A	63	B	88	
14	A	39	B	64	B	89	
15	D	40	A	65	A	90	
16	C	41	A	66	A	91	
17	C	42	A	67	C	92	
18	D	43	A	68	D	93	
19	C	44	C	69	C	94	
20	D	45	B	70	D	95	
21	C	46	D	71		96	
22	A	47	D	72		97	
23	C	48	A	73		98	
24	B	49	A	74		99	
25	D	50	D	75		100	

Note/Remarks :

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7/5/2019

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