

53

QUESTION PAPER  
SERIES CODE  
**A**

Registration No. : 

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Centre of Exam. : \_\_\_\_\_

Name of Candidate : \_\_\_\_\_

\_\_\_\_\_  
Signature of Invigilator

**ENTRANCE EXAMINATION, 2013**

M.Sc. LIFE SCIENCES

[ Field of Study Code : SLSM (225) ]

Time Allowed : 3 hours

Maximum Marks : 100

**INSTRUCTIONS FOR CANDIDATES**

Candidates must read carefully the following instructions before attempting the Question Paper :

- (i) Write your Name and Registration Number in the space provided for the purpose on the top of this Question Paper and in the Answer Sheet.
- (ii) **Please darken the appropriate Circle of Question Paper Series Code on the Answer Sheet.**
- (iii) The Question Paper is divided into two parts : Part—A and Part—B. Both parts have multiple-choice questions. All answers are to be entered in the Answer Sheet provided with the Question Paper for the purpose by darkening the correct choice, i.e., (a) or (b) or (c) or (d) with BALLPOINT PEN only against each question in the corresponding Circle.
- (iv) Part—A consists of 30 questions and all are compulsory.
- (v) Part—B contains 103 questions. **Answer any 70 questions.**  
In case any candidate answers more than the required 70 questions, the first 70 questions attempted will be evaluated.
- (vi) Each correct answer carries 1 mark. **There will be negative marking and ½ mark will be deducted for each wrong answer.**
- (vii) Answer written by the candidates inside the Question Paper will not be evaluated.
- (viii) Calculators and Log Tables may be used.
- (ix) Pages at the end have been provided for Rough Work.
- (x) Return the Question Paper and Answer Sheet to the Invigilator at the end of the Entrance Examination. **DO NOT FOLD THE ANSWER SHEET.**

**INSTRUCTIONS FOR MARKING ANSWERS**

- 1. Use only Blue/Black Ballpoint Pen (do not use pencil) to darken the appropriate Circle.
- 2. Please darken the whole Circle.
- 3. Darken ONLY ONE CIRCLE for each question as shown in example below :

|             |               |             |             |               |
|-------------|---------------|-------------|-------------|---------------|
| Wrong       | Wrong         | Wrong       | Wrong       | Correct       |
| ● (b) (c) ● | ⊗ (b) (c) (d) | ⊗ (b) (c) ⊗ | ● (b) (c) ● | (a) (b) (c) ● |

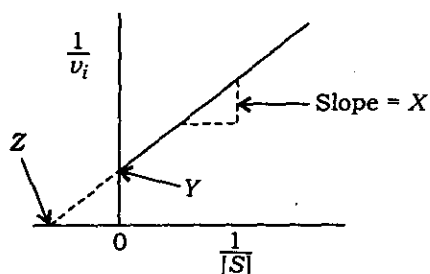
- 4. Once marked, no change in the answer is allowed.
- 5. Please do not make any stray marks on the Answer Sheet.
- 6. Please do not do any rough work on the Answer Sheet.
- 7. Mark your answer only in the appropriate space against the number corresponding to the question.
- 8. **Ensure that you have darkened the appropriate Circle of Question Paper Series Code on the Answer Sheet.**



**PART—A**

Answer **all** questions

1. The first biochemical systems on earth were centered probably on one of the following types of biomolecule :
  - (a) Carbohydrates
  - (b) Deoxyribonucleic acids
  - (c) Proteins
  - (d) Ribonucleic acids
2. If the molar amount of G in a DNA sample is 20%, what is the molar amount of T in the sample?
  - (a) 20%
  - (b) 30%
  - (c) 40%
  - (d) 60%
3. Define X, Y and Z with respect to the following figure regarding enzyme kinetics :



- (a)  $V_{\max}/K_M$ ,  $1/V$ ,  $1/K_M$
  - (b)  $K_M/V_{\max}$ ,  $1/V_{\max}$ ,  $-1/K_M$
  - (c)  $V_{\max}/K_M$ ,  $V_{\max}$ ,  $K_M$
  - (d)  $K_M/V_{\max}$ ,  $V_{\max}$ ,  $K_M$
4. Which one of the following methods **cannot** be used to measure levels of expressed RNA quantitatively?
    - (a) Northern hybridization
    - (b) RT-PCR (in the linear range)
    - (c) RNase protection assay
    - (d) Primer extension

5. Which one of the following is an inhibitor of prokaryotic transcription?
- (a) Ciprofloxacin
  - (b) Etoposide
  - (c) Erythromycin
  - (d) Rifampicin
6. The C-value paradox
- (a) is due to the accumulation of non-coding DNA sequences in the genome of an organism
  - (b) states that the genome complexity is a direct measurement of the evolutionary status of the organism
  - (c) refers to the diploid genome content of an organism
  - (d) is not related to the CoT values
7. Which structure is usually present only in animal cells?
- (a) Vacuole
  - (b) Cell wall
  - (c) Nucleus
  - (d) Centriole
8. Depolymerization of microtubules is inhibited by
- (a) kinesin
  - (b) actin
  - (c) guanosine triphosphate
  - (d) vimentin
9. Mitochondrial enzymes for oxidative metabolism are located
- (a) on or within the surface of cristae
  - (b) on the outer membrane
  - (c) in the matrix
  - (d) in the mitochondrial lysosomes

10. Which one of the following is the checkpoint in the yeast cell cycle stage that determines the commitment of cells for DNA replication?
- (a)  $G_0$
  - (b)  $G_2/M$
  - (c)  $G_1$
  - (d) Metaphase-to-anaphase transition
11. Which one of the following basic developmental processes is most dependent on cellular movements?
- (a) Cell differentiation
  - (b) Growth
  - (c) Pattern formation
  - (d) Morphogenesis
12. Which one of the following disease is caused by bacteria?
- (a) Tinea (Athlete's foot)
  - (b) The common cold
  - (c) Typhoid fever
  - (d) Diabetes
13. A yellow-bodied *Drosophila* female was crossed to a white-eyed male. Both the parental phenotypes are caused by X-linked recessive mutations. The dominant alleles encode brown body colour and red eyes. What would be the phenotypes of the offsprings?
- (a) Daughters yellow-bodied and sons red-eyed
  - (b) Daughters red-eyed and sons yellow-bodied
  - (c) Daughters and sons white-eyed and yellow-bodied
  - (d) Daughters and sons red-eyed and brown-bodied

14. The amount of ATP required for the synthesis of one glucose molecule in the C4 pathway is
- (a) 12 ATP
  - (b) 18 ATP
  - (c) 24 ATP
  - (d) 30 ATP
15. Chlorophyll molecules are green because they
- (a) absorb green light
  - (b) absorb red light and emit green light
  - (c) do not absorb green light
  - (d) absorb red light and emit blue light
16. Secondary meristem is the one that
- (a) develops into xylem and phloem
  - (b) develops from a differentiated cell
  - (c) differentiate into terminal cell
  - (d) develops during later phase of embryogenesis
17. The major oxygen assimilation process in plants is
- (a) photosynthesis
  - (b) photorespiration
  - (c) respiration
  - (d) transpiration

18. Urine storage tendency of the urinary bladder in mammals is mainly due to the
- (a) transitional epithelium
  - (b) columnar epithelium
  - (c) cuboidal epithelium
  - (d) columnar ciliated epithelium
19. Arthropods have
- (a) convex and compound eye
  - (b) concave and concave eye
  - (c) convex and simple eye
  - (d) concave and simple eye
20. 'Climate' is an average condition referring to the meteorological conditions including temperature, precipitation and wind that characteristically prevail in a particular region
- (a) year after year
  - (b) month after month
  - (c) hour after hour
  - (d) day after day
21. Which concept was **not** included in Charles Darwin's theory of natural selection?
- (a) Survival of the fittest
  - (b) Struggle for existence
  - (c) Exponential population growth
  - (d) Punctuated equilibrium

22. Which one of the following statements is false?
- (a) Chromosomal aberrations are divided into 'chromosome aberrations' and 'chromatid aberrations'.
  - (b) Chromosome aberrations are caused by irradiation that takes place before the DNA is duplicated.
  - (c) Chromatid aberrations are caused by irradiation that takes place after the DNA is duplicated.
  - (d) Chromatid aberrations involved identical breaks in the two strands of chromatin of the duplicated DNA structure.
23. A train covers a distance of 300 km at a certain average speed. If its speed were decreased by 10 km/hr, the journey would take 1 hour longer. What is the average speed of the train?
- (a) 40 km/hr
  - (b) 50 km/hr
  - (c) 60 km/hr
  - (d) 70 km/hr
24. In prokaryotes, lipid bilayer is associated with the
- (a) gram-positive cell wall
  - (b) gram-negative cell wall
  - (c) plasma membrane or cell membrane
  - (d) nuclear membrane
25. Viral capsid is composed of
- (a) DNA
  - (b) RNA
  - (c) protein
  - (d) lipid



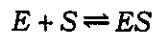
26. Which one of the following is a micronutrient?
- (a) Nitrogen
  - (b) Carbon
  - (c) Manganese
  - (d) Magnesium
27. The bond angle in  $\text{H}_2\text{O}$  is
- (a)  $120^\circ$
  - (b)  $109.5^\circ$
  - (c)  $107.4^\circ$
  - (d)  $104.5^\circ$
28. The carbon atoms in graphite are bonded together through
- (a)  $sp^3$ -hybrid bonds
  - (b)  $sp^2$ -hybrid bonds
  - (c)  $sp$ -hybrid bonds
  - (d)  $p$ -bonds
29. We can hear sounds that are produced around a corner but cannot see light that is produced around a corner, because
- (a) light travels only in straight lines whereas sound can travel in a curved path
  - (b) sound has more energy than light
  - (c) sound has shorter wavelengths than light
  - (d) sound has longer wavelengths than light
30. Average kinetic energy of molecules is
- (a) directly proportional to square root of temperature
  - (b) directly proportional to absolute temperature
  - (c) independent of absolute temperature
  - (d) inversely proportional to absolute temperature

## PART—B

Answer *any seventy* questions

31. Where will the 'R' group of a hydrophobic amino acid found in a protein?
- (a) In a peptide bond formation with the next amino acid in the chain
  - (b) On the outer surface of the folded chain, embedded in water
  - (c) On the inner surface of the folded chain, away from water
  - (d) Only at one end of the protein chain
32. Most biopolymers are formed by
- (a) hydrophobic interactions
  - (b) dehydration and condensation
  - (c) esterification reaction
  - (d) hydrolysis
33. In a subcellular fractionation, which one of the following enzymes would you use as a marker for mitochondrial fraction?
- (a) Glucose-6-phosphate dehydrogenase
  - (b) Malate dehydrogenase
  - (c) Pyruvate kinase
  - (d) Succinate dehydrogenase
34. Codon is composed of triplet sequence of
- (a) nucleotide bases in mRNA
  - (b) nucleotide bases in DNA
  - (c) amino acids in polypeptide chains
  - (d) deoxyribose sugars in DNA

35. In the following reaction



$K'_{eq}$  is also defined as the

- (a) dissociation constant
  - (b) association constant
  - (c) affinity constant
  - (d) specificity constant
36. The FO-F1 ATPase is located in the
- (a) mitochondrial matrix
  - (b) outer mitochondrial membrane with F1 end-facing cytosol
  - (c) inner mitochondrial membrane with F1 end-facing intermembrane space
  - (d) inner mitochondrial membrane with F1 end-facing the matrix
37. The molecule to which fatty acids are esterified to form triacylglycerols is
- (a) glycerol
  - (b) sphingosine
  - (c) an oligosaccharide
  - (d) phospholipid
38. Which one of the following compounds is responsible for the coordinated regulation of glucose and glycogen metabolism?
- (a)  $NAD^+$
  - (b) Fructose-2,6-bisphosphate
  - (c) Acetyl-CoA
  - (d) Fructose-1,6-bisphosphate
39. The cells dependent solely on glucose as an energy source are
- (a) muscle cells
  - (b) erythrocytes
  - (c) kidney cells
  - (d) liver cells

40. When a reaction comes to an equilibrium, it is always the case that
- (a)  $\Delta G^\circ = 0$
  - (b)  $K_{eq} = 1$
  - (c)  $\Delta G = \Delta G^\circ$
  - (d)  $\Delta G = 0$
41. Embedded in the inner membrane of the mitochondrion are
- (a) the enzymes of the tricarboxylic acid cycle (Krebs' cycle)
  - (b) the components of the electron transport chain
  - (c) glycogen molecules
  - (d) triacylglycerol molecules
42. In an autopolyploid, the nucleus
- (a) is derived from the fusion of gametes from two different species
  - (b) contains extra copies of a single chromosome
  - (c) is derived from the fusion of two diploid gametes from the same species
  - (d) contains extra copies of the sex chromosomes
43. Which of the following events could lead to the evolution of a new gene that contains exons from two or more other genes?
- (a) Domain duplication
  - (b) Domain shuffling
  - (c) Gene conversion
  - (d) Gene duplication
44. The enzyme responsible for continuing DNA replication in prokaryotes, once it is initiated, is
- (a) DNA polymerase I
  - (b) DNA polymerase III
  - (c) Polymerase beta
  - (d) Polymerase delta

45. The oncogene Ras binds
- (a) ATP
  - (b) GTP
  - (c) PKA
  - (d) PKC
46. DNA methylation is associated with
- (a) CpG islands
  - (b) CAT box
  - (c) TATA box
  - (d) Shine-Dalgarno sequence
47. In the classical model of transcriptional control described by Jacob and Monod, a repressor protein binds to
- (a) an AUG sequence
  - (b) an enhancer
  - (c) an operator
  - (d) a TATA box
48. All of the following are involved in translating information into proteins, **except**
- (a) rRNA
  - (b) siRNA
  - (c) tRNA
  - (d) snRNA
49. What is a microsatellite?
- (a) Genomic repeat sequences that are variable between individuals in a species
  - (b) Single-nucleotide differences between genomic regions
  - (c) Short chromosomal deletions
  - (d) Tandem purine repeat sequences at the telomeric regions

50. Which of the following is **not** a feature of eukaryotic gene expression?
- (a) Many genes are interrupted by noncoding DNA sequences
  - (b) RNA synthesis and protein synthesis are coupled
  - (c) mRNA is often extensively modified before translation
  - (d) Multiple copies of nuclear genes, and pseudogenes can occur
51. The primary RNA transcript of the chicken ovalbumin gene is 7700 nucleotides long, but the mature mRNA that is translated on the ribosome is 1872 nucleotides long. The size difference occurs primarily as a result of
- (a) cleavage of polycistronic mRNA
  - (b) removal of poly A tails
  - (c) reverse transcription
  - (d) splicing
52. Which one of the following therapeutic antibiotics blocks the peptidyl transferase reaction of protein synthesis?
- (a) Chloramphenicol
  - (b) Erythromycin
  - (c) Tetracycline
  - (d) Puromycin
53. A Shine-Dalgarno sequence
- (a) serves as a binding site for bacterial ribosome
  - (b) is involved in bacterial transcription
  - (c) serves as a recognition site for stopping mRNA synthesis
  - (d) serves as a recognition site for termination of translation

54. A primer extension experiment was carried out using a primer from +50 position from translational start site. The sizes of the fragments were found to be 100 and 150 nucleotides. The results suggest
- (a) the size of the 5'-UTR is 100
  - (b) the size of the 5'-UTR is 50
  - (c) there is no UTR in this gene
  - (d) there are two start sites generating two different mRNAs with UTRs of 50 and 100 nucleotides
55. Homologous structures among animals provide evidence for evolution in which these structures are
- (a) different in different animals but are modifications of the same basic structure
  - (b) similar in function but of different basic structure
  - (c) all shown in fossil records
  - (d) all produced by the same gene
56. When a signal molecule arrives at a G protein-linked receptor, the G protein
- (a) becomes deactivated
  - (b) binds to the signal molecule
  - (c) become activated
  - (d) binds with calcium
57. The melting temperature of a DNA molecule is determined by using
- (a) electrophoresis
  - (b) change in electrical conductivity
  - (c) column chromatography
  - (d) change in optical density
58. The first mouse generated in the process of making a knockout
- (a) is usually normal
  - (b) usually does not survive
  - (c) is homozygous for the knockout in some cells only
  - (d) is heterozygous in some cells only

59. Which of the following events would occur at the *E. coli lac* operon when the glucose concentration of the growth medium is low and the lactose concentration is high?
- (a) The *lac* repressor protein will bind to the operator sequence
  - (b) Ribosomes will stall during translation of the first 13 amino acids
  - (c) The transcribed RNA will form a cAMP-dependent stem-loop structure to terminate transcription
  - (d) The catabolite gene activator protein (CAP), bound with cAMP will stimulate binding of RNA polymerase to the promoter
60. Which one of the following will most likely lead to a loss of gene function?
- (a) A missense mutation in the open reading frame
  - (b) A change from TAA codon to TAG codon in the coding region
  - (c) A change from T to C in the coding region
  - (d) A frame shift in the coding region
61. Which one of the following is best suited for the visualization of the distribution of transmembrane proteins in the plane of a cell membrane?
- (a) Thin-section electron microscopy
  - (b) Freeze-fracture electron microscopy
  - (c) Scanning electron microscopy
  - (d) SDS-gel electrophoresis
62. Which one of the following cyclins is induced by mitogens?
- (a) Cyclin A
  - (b) Cyclin B
  - (c) Cyclin D
  - (d) Cyclin E
63. To make a vaccine against chicken cholera that would not kill the chicken, Pasteur
- (a) treated the sample with heat to kill the microorganisms
  - (b) attenuated the strain by repeatedly passaging it in culture
  - (c) used a related but different microorganism from the animals
  - (d) used very small, non-lethal amounts of the material



64. *Cryptosporidium*, *Giardia* and *Entamoeba histolytica* are transmitted via which route?
- (a) Through blood contact
  - (b) Fecal-oral transmission
  - (c) Air-borne (through sneezing or coughing)
  - (d) Through insect bite
65. A patient suffers from a pyruvate kinase deficiency of the red blood cells. Which one of the following substances is likely to be present in abnormally high levels in this patient's red blood cells?
- (a) Lactic acid
  - (b) Alanine
  - (c) Phosphoenolpyruvate
  - (d) Pyruvate
66. Which one of the following pairs of processes are anaerobic?
- (a) Fermentation and glycolysis
  - (b) Fermentation and the citric acid cycle
  - (c) The citric acid cycle and the electron transport system
  - (d) Glycolysis and the electron transport system
67. Which one of the following processes converts ammonium into nitrate?
- (a) Nitrogen fixation
  - (b) Ammonification
  - (c) Nitrification
  - (d) Denitrification
68. Which one of the following genera is used in breads, wine and beer production?
- (a) *Lactobacillus*
  - (b) *Saccharomyces*
  - (c) *Pseudomonas*
  - (d) *Staphylococcus*

69. The sequence of which ribosomal genes are most commonly used for establishing phylogenetic relationship?
- (a) 5S
  - (b) 16S
  - (c) 23S
  - (d) 16S and 23S
70. Unlike other genera of archea, *Thermoplasma* and *Picrophilus* grow best in which of the following extreme conditions?
- (a) High pH
  - (b) Low pH
  - (c) High temperature
  - (d) Low temperature
71. Prepatent period in malarial infection is the
- (a) interval between inoculation and fever
  - (b) duration between inoculation and start of blood cycle
  - (c) interval between two liver cycles
  - (d) duration between repetition of fever
72. Endotoxin is associated with
- (a) gram-positive bacteria
  - (b) gram-negative bacteria
  - (c) the cell wall
  - (d) the endospore
73. In *Xenopus*, the elongation of the mesoderm towards the anterior result from the intercalation of cells during a process, is called
- (a) convergent extension
  - (b) involution
  - (c) invagination
  - (d) epiboly

74. The *agamous* mutation causes the formation of
- (a) flowers with only petals and sepals
  - (b) flowers with only sepals and carpels
  - (c) flowers with only stamens and carpels
  - (d) plants completely lacking flowers
75. A morphogen is a
- (a) cell or group of cells that signal other cells to become determined in a specific way
  - (b) gene that causes a cell or group of cells to adopt a particular shape
  - (c) signalling molecule that causes the differentiation of neighbouring cells
  - (d) signalling molecule that confers concentration-dependent positional information
76. Which is the correct hierarchy of gene activity in early *Drosophila* segmentation?
- (a) Gap, segment polarity, pair rule, maternal
  - (b) Maternal, gap, pair rule, segment polarity
  - (c) Maternal, pair rule, gap, segment polarity
  - (d) Segment polarity, maternal, gap, pair rule
77. Gastrulation in sea urchins, *Drosophila* and *Xenopus* all begin with a change in cell shape, in which the apical surface of an epithelial sheet contracts. This process is called
- (a) convergent extension
  - (b) involution
  - (c) invagination
  - (d) epiboly
78. Which of the following adjuvants are approved for use in human vaccines?
- (a) Aluminium potassium sulfate (Alum)
  - (b) Freund's incomplete adjuvant
  - (c) Bacterial lipopolysaccharide
  - (d) Freund's complete adjuvant

79. An attenuated vaccine is composed of
- (a) killed microorganisms
  - (b) living weakened microorganisms
  - (c) inactivated bacterial toxins
  - (d) recombinant vectors
80. A discontinuous antigen epitope is
- (a) presented by the MHC molecules
  - (b) representative of only a minority of T-cell epitopes
  - (c) produced by a continuous linear peptide sequence
  - (d) produced by amino acid residues on non-adjacent polypeptide sequences
81. The Fab region of an Ig is responsible for
- (a) binding to complement
  - (b) binding to antigen
  - (c) binding to Fc receptors
  - (d) binding to macrophages
82. Ig idiotypes are found in the
- (a) constant region of the heavy chain
  - (b) constant region of the light chain
  - (c) hinge region of the heavy chain
  - (d) variable region of both heavy and light chains
83. During synapsis, the
- (a) sister chromatids pair all along their length
  - (b) sister chromatids pair at the centromeres
  - (c) homologous chromosomes repel each other except at the ends
  - (d) homologous chromosomes pair all along their length

84. Mitotic cell division results in two cells that have
- (a)  $n$  chromosomes and are genetically identical
  - (b)  $n$  chromosomes and are genetically different
  - (c)  $2n$  chromosomes and are genetically identical
  - (d)  $2n$  chromosomes and are genetically different
85. How many different kinds of F<sub>2</sub> genotypes are possible from AABBCc × aabbcc?
- (a) 9
  - (b) 8
  - (c) 36
  - (d) 27
86. The gene-chromosome theory states that
- (a) chromosomes from both parents always have identical genes
  - (b) homologous chromosomes do not have alleles
  - (c) genes exist at definite loci in a linear sequence on chromosomes
  - (d) Mendel's principles no longer apply to genetics
87. The offsprings resulting from a cross between two pure homozygous recessives would be
- (a) 50% homozygous recessive and 50% heterozygous recessive
  - (b) 100% homozygous recessive
  - (c) 75% homozygous recessive and 25% heterozygous dominant
  - (d) 75% homozygous recessive and 25% homozygous dominant
88. Which one of the following viruses does **not** replicate in the cytoplasm?
- (a) Tobacco mosaic virus
  - (b) Vaccinia virus
  - (c) Influenza virus
  - (d) SARS virus

89. Which one of the following enzymes could be inhibited by glucose-6-phosphate?
- (a) Fructose-1,6-biphosphate
  - (b) Glucokinase
  - (c) Hexokinase
  - (d) Phosphorylase kinase
90. Auxin transport is
- (a) polar
  - (b) non-polar
  - (c) symplast
  - (d) apoplast
91. When a germinated seedling is allowed to continue to grow in dark, the plastid containing pigment is named as
- (a) chloroplast
  - (b) protochlorophyllide
  - (c) prolamellar bodies
  - (d) amyloplast
92. The plant hormone responsible for stomata closure and opening is
- (a) gibberellic acid 3
  - (b) indole acetic acid
  - (c) abscisic acid
  - (d) ethylene
93. Which one of the following pair of gases contribute the maximum to the greenhouse effect?
- (a)  $\text{CO}_2$  and  $\text{N}_2\text{O}$
  - (b)  $\text{CO}_2$  and  $\text{CH}_4$
  - (c)  $\text{CH}_4$  and  $\text{N}_2\text{O}$
  - (d)  $\text{CFC}_5$  and  $\text{N}_2\text{O}$

94. Breeding of plants with elevated levels of minerals, vitamins or higher protein and healthier fats is called as
- (a) micropropagation
  - (b) somatic hybridization
  - (c) biofortification
  - (d) biomagnification
95. Evolutionary modifications that improve the survival and reproductive success of an organism are called
- (a) mutations
  - (b) vestigial structures
  - (c) homoplastic traits
  - (d) adaptations
96. How many chromosomes ( $n$ ) does the common weed *Arabidopsis thaliana* have in its genome?
- (a) 5
  - (b) 10
  - (c) 6
  - (d) 12
97. The element that regulates osmotic potential in a plant cell is
- (a) nitrogen
  - (b) magnesium
  - (c) potassium
  - (d) phosphorus
98. Which one of the following tissues shows only symplastic water movement?
- (a) Root epithelial cells bearing root hair
  - (b) Root epithelial cells lacking root hair
  - (c) Root cortical cells
  - (d) Root endodermal cells

99. Mark the correct sequence of events that takes place in the buccal cavity on food :
- (a) Tasting, softening, mastication, salivary action, bolus formation, swallowing
  - (b) Softening, tasting, mastication, salivary action, bolus formation, swallowing
  - (c) Softening, mastication, tasting, salivary action, bolus formation, swallowing
  - (d) Tasting, mastication, softening, salivary action, bolus formation, swallowing
100. Contractile vacuole is present in
- (a) marine protozoa
  - (b) freshwater protozoans
  - (c) Both (a) and (b)
  - (d) parasitic protozoa
101. When acetylcholine is broken down by acetylcholinesterase in the synaptic cleft, what happens to the choline?
- (a) It is destroyed
  - (b) It is made into new acetylcholinesterase
  - (c) It is reabsorbed at the presynaptic terminal and combined with more acetic acid to make acetylcholine
  - (d) It is taken up at the post-synaptic terminal
102. When individuals in a population, reproduce at a constant rate, it is called
- (a) logistic growth
  - (b) growth density
  - (c) exponential growth
  - (d) multiple growth
103. In females, hormone oestrogen stimulates uterine contraction in the presence of
- (a) vasopressin
  - (b) oxytocin
  - (c) progesterone
  - (d) prolactin



104. Which one of the following statements is true?
- (a) Gastric acid is secreted by parietal cells of the gastric glands in response to hormonal stimulation
  - (b) Most of the acid and pepsinogen secreted by the stomach occurs during the intestinal phase of gastric secretion
  - (c) Gastric secretion does not begin until food enters the stomach
  - (d) Secretin secreted by the duodenum stimulates gastric secretion
105. In muscles, ionic strength of G-actin is increased due to the presence of
- (a) aluminium
  - (b) magnesium
  - (c) zinc
  - (d) iron
106. According to allometric relationship, cats sleep so much more than humans because they are
- (a) lazy
  - (b) smaller and lighter
  - (c) lighter
  - (d) nocturnal
107. The formation of two or more descendant species from a single ancestral species where all occupy the same geographic location is termed as
- (a) parapatric speciation
  - (b) peripatric speciation
  - (c) allopatric speciation
  - (d) sympatric speciation
108. Paracoels are the cavities present in the
- (a) medulla oblongata
  - (b) optic lobes
  - (c) spinal cord
  - (d) cerebral hemisphere

109. Which one of the following represent the respiratory exchange ratio (RER)?
- (a) Volume of oxygen consumed + Volume of carbon dioxide produced
  - (b) Volume of carbon dioxide produced + Volume of oxygen consumed
  - (c) Volume of oxygen produced + Volume of carbon dioxide consumed
  - (d) Volume of oxygen consumed + Body mass
110. The flat cells of simple squamous epithelium are specialized for
- (a) diffusion and filtration
  - (b) secretion and lubrication
  - (c) absorption in the gastrointestinal tract
  - (d) removal of dust in the respiratory system
111. If the list price of a toy is reduced by ₹ 2, a person can buy 2 toys more for ₹ 360. Find the original price of the toy.
- (a) ₹ 18
  - (b) ₹ 19
  - (c) ₹ 20
  - (d) ₹ 21
112. One side of a rectangle exceeds its other side by 2 cm. If its area is  $195 \text{ cm}^2$ , determine the side of the rectangle.
- (a) 14, 16
  - (b) 15, 17
  - (c) 13, 15
  - (d) 12, 14
113. The square root of 64009 is
- (a) 253
  - (b) 363
  - (c) 347
  - (d) 803

114. A bag contains 2 red, 3 green and 2 blue balls. Two balls are drawn at random. What is the probability that none of the balls drawn is blue?
- (a)  $10/21$
  - (b)  $11/21$
  - (c)  $2/7$
  - (d)  $5/7$
115. The price of 10 chairs is equal to that of 4 tables. The price of 15 chairs and 2 tables together is ₹ 4,000. The total price of 12 chairs and 3 tables is
- (a) ₹ 3,500
  - (b) ₹ 3,750
  - (c) ₹ 3,840
  - (d) ₹ 3,900
116.  $pK_a$  for aspartic acid (Asp) in aqueous solution is  $\sim 4.0$ . What would be its  $pK_a$  in an organic solvent of lower polarity?
- (a) Lower than 4.0
  - (b) Higher than 4.0
  - (c) Unchanged
  - (d) Undetermined, since  $pK_a$  cannot be determined in any solvent other than water
117. Acetate ion is used in an  $S_N2$  reaction using different solvents. In which solvent would you expect a better  $S_N2$  reaction to occur?
- (a) Methanol
  - (b) DMSO
  - (c) Acetic acid
  - (d) Water
118. Which of the following reactions will **not** result in the formation of carbon-carbon bond?
- (a) Reimer-Tiemann reaction
  - (b) Friedel-Crafts acylation 2-methyl-1-butene
  - (c) Wurtz reaction
  - (d) Cannizzaro's reaction

119. Which one of the following enzyme-substrate pairs is the odd one out?
- (a) Diastase-maltose
  - (b) Invertase-sucrose
  - (c) Zymase-starch
  - (d) Papain-protein
120. A gold wire of resistance  $24 \Omega$  is stretched uniformly to a length equal to 4 times its original length, its new resistance will be
- (a)  $94 \Omega$
  - (b)  $144 \Omega$
  - (c)  $288 \Omega$
  - (d)  $384 \Omega$
121. At what height above the earth's surface, value of ' $g$  (gravitational constant)' is same as in a mine of 100 km deep?
- (a) 100 km
  - (b) 200 km
  - (c) 50 km
  - (d) 25 km
122. If an electron and a proton have the same de Broglie wavelength, then the kinetic energy of the electron is
- (a) zero
  - (b) less than that of a proton
  - (c) more than that of a proton
  - (d) equal to that of a proton
123. The radii of the half-period zones in the phenomenon of diffraction depends on the number of zones as
- (a) inversely proportional to  $1/\sqrt{n}$
  - (b) directly proportional to  $\sqrt{n}$
  - (c) inversely proportional to  $1/n^3$
  - (d) directly proportional to  $1/n^{3/2}$

124. Which one of the following is the most common type of cancer identified in children who were in the vicinity of the Chernobyl nuclear power plant when it exploded in 1986?
- (a) Osteosarcoma
  - (b) Leukemia
  - (c) Thyroid cancer
  - (d) Glioma
125. The phase of the cell cycle that generally exhibits the greatest resistance to ionizing radiation is
- (a) M
  - (b) G<sub>1</sub>
  - (c) Early S
  - (d) Late S
126. Radiation-induced injury to biological organisms always begins with
- (a) nuclear transformation
  - (b) chemical changes at the atomic and molecular level
  - (c) significant localized heating
  - (d) polarization of electromagnetic energy
127. Which one of the following is a correct statement?
- (a) Beta rays are same as cathode rays
  - (b) Gamma rays are high energy neutrons
  - (c) Alpha particles are singly ionized helium atoms
  - (d) Protons and neutrons have exactly same mass
128. Griffith's transformation experiment was carried out using
- (a) *Escherichia coli*
  - (b) *Bacillus subtilis*
  - (c) *Diplococcus pneumoniae*
  - (d) *Salmonella typhimurium*

- 129.** Links between organisms that show branching pattern of evolutionary relationships are shown by
- (a) living fossils
  - (b) phylogenetic trees
  - (c) comparative embryology
  - (d) two fossil layers
- 130.** By studying analogous structures, we look for
- (a) similarities in appearance and function but different in structure
  - (b) similarities in appearance but differences in functions
  - (c) similarities in organ structure
  - (d) similarities in cell make up
- 131.** Nucleic acid hybridization can be used as a measure of evolutionary relationships between species. Of the following statements about the DNA of related species, which is true?
- (a) Closely related species form hybrid DNAs with relatively low melting temperatures
  - (b) Closely related species form hybrid DNAs with relatively high melting temperatures
  - (c) There is no correlation between DNA hybrid melting temperature and relatedness of species
  - (d) One cannot create DNA hybrid molecules from DNAs of closely related species
- 132.** ELISA is based on
- (a) antigen-antibody interaction
  - (b) antigen-protein interaction
  - (c) lectin-antibody interaction
  - (d) antigen-lectin interaction
- 133.** The mutagenicity of a compound can be detected by
- (a) ELISA
  - (b) Ames's test
  - (c) Western blotting
  - (d) All of the above

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