

HALL TICKET NO:



ST. ANTHONY'S COLLEGE, SHILLONG

**ENTRANCE TEST FOR ADMISSION INTO
GRADUATE PROFESSIONAL COURSES
2005**

BIOTECHNOLOGY (Part A)

DATE : 12 May 2005
TIME : 9.30 am
DURATION : 1 hour 30 minutes

INSTRUCTIONS

- ◆ There are 120 questions in this test, divided into two parts. The questions of Part A are to be answered in the answer sheet provided and the questions of Part B are to be answered in the question paper itself.
- ◆ The candidate is to answer as many questions as possible in the time that is allotted for this test.
- ◆ The required rough work may be done on the sheet that is provided for the purpose.
- ◆ Make sure that you have entered the hall ticket number and subject properly in the place provided in the answer sheet. Enter only the hall ticket number of Biotechnology.
- ◆ Please preserve your hall tickets. They will be required at the time of admission.
- ◆ The hall ticket numbers of those shortlisted for admission on the basis of the entrance test will be published on the college notice boards and on the college web site on 16 May, 2005. The final admission will be done on a first come, first served basis, after the marksheets of the Class XII examinations of the Meghalaya Board of School Education are available, provided the eligibility criteria as laid down in the prospectus are fulfilled.

Part A

Directions : Choose the best answer in each of the following. Each correct answer carries one mark. For each wrong answer .25 mark will be deducted.

- Synapsis is pairing of
 - any two chromosomes
 - nonhomologous chromosomes
 - acentric chromosomes
 - homologous chromosomes
- Genetics is the study of
 - the environment
 - structure of cells
 - inheritance
 - heredity and variations of organisms
- Offspring of a cross between two organisms that differ in at least one set of characters is called a
 - Haploid
 - Diploid
 - Chimera
 - Hybrid
- Special structures called telomeres are needed in eukaryotic cells but not in bacteria because eukaryotic cells contain
 - linear chromosomes
 - more than one chromosome
 - a nucleus
 - more forms of DNA polymerase.
- Granum is a component of
 - Chloroplasts
 - Golgi bodies
 - Ribosomes
 - Starch grains
- Pitcher of *Nepenthes* is formed from
 - Lamina
 - Petiole
 - Apex
 - Leaf base
- Modern biology explains the presence of variations due to
 - DNA
 - protein
 - carbohydrate
 - RNA
- The half life period for a zero order reaction is equal to
 - $2k [A]_0$
 - $[A]_0/2k$
 - $0.693/k$
 - $0.693/k [A]_0$
- For a spontaneous reaction ΔG should be
 - positive
 - negative
 - equal to zero
 - may be positive or negative.
- Which of the following is correct about an enzyme?
 - It changes the equilibrium constant
 - It increases the activation energy
 - It reduces the activation energy
 - None of these.
- German silver is an alloy of
 - Cu, Sn, Al
 - Cu, Zn, Ni
 - Cu, Zn, Ag
 - Fe, Cr, Ni
- If 8.0 gm of a radioactive substance has a half life of 10 hr, the half life of 2.0 gm of the same substance is
 - 2.5 hr
 - 5.0 hr
 - 10 hr
 - 40 hr
- The pair likely to form strongest hydrogen bonding is
 - H_2O_2 & H_2O
 - $HCOOH$ & CH_3COOH
 - CH_3COOH & CH_3COOCH_3
 - SiH_4 & $SiCl_4$
- The total number of unpaired electrons in d-orbitals of an unexcited atom of element of atomic number 29 is
 - 10
 - 1
 - 0
 - 5

15. The antiderivative of $\int x e^x dx$ equals
 a) $x e^x$
 b) $x e^x + e^x$
 c) $x(e^x - 1)$
 d) $e^x(x - 1)$
16. The derivative of $\sqrt{(2x^2+3)}$ equals
 a) $4x$
 b) $4x \sqrt{(2x^2+3)}$
 c) $2(2x^2+3)^{-1/2}$
 d) None of these
17. Oxygen evolved in photosynthesis come from
 a) H_2O
 b) NADP
 c) CO_2
 d) $C_6H_{12}O_6$
18. Which of the following disease is sex-linked?
 a) Haemophilia
 b) Diabetes
 c) Influenza
 d) Tuberculosis
19. Albinism is a
 a) Hereditary disease
 b) Deficiency disease
 c) Sex-linked disease
 d) Degenerative disease
20. Transpiration is helpful in
 a) Ascent of sap
 b) Loss of excess water
 c) Cooling
 d) Loss of nutrients
21. One mol of H_2O corresponds to
 a) 22.4 litre at 1 atm and 25° C
 b) 18 gm
 c) 1 gm
 d) 6.02×10^{23} atom of Hydrogen and 6.02×10^{23} atom of Oxygen
22. 18.25 gm of NaOH is dissolved in water to give 200 ml of solution. What is the molarity of the solution?
 a) 2.28M
 b) 20.8M
 c) 4.0M
 d) 1.5M
23. For which of the following hybridization the bond angle is maximum?
 a) sp^2
 b) sp
 c) sp^3
 d) dsp^2
24. Trachoma is a disease of the
 a) Lungs
 b) Ears
 c) Intestines
 d) Eyes
25. The mineral present in the chlorophyll molecule is
 a) Manganese
 b) Iron
 c) Magnesium
 d) Potassium
26. Transpiration occurs from
 a) Surface
 b) Leaves
 c) Stem
 d) Aerial parts of plant
27. In a toss of 4 unbiased coins, the probability of obtaining 2 heads is
 a) $1/2$
 b) $1/3$
 c) $3/8$
 d) $7/16$
28. If x , $2x+2$ and $3x + 3$ are in GP, the value of x is
 a) 4
 b) -4
 c) $4/3$
 d) $-4/3$
29. The value of $\int_{-\pi/2}^{\pi/2} \sin^{17} x dx$ is
 a) 0
 b) 1
 c) $\pi/2$
 d) cannot be determined

30. In a group of people, there are 5 men and 6 women. In how many ways can a committee of 3 men and 4 women be chosen from this group?
 a) 100
 b) 225
 c) 150
 d) 250
31. If a wire of resistivity ρ is stretched to double its length, then its new resistivity will
 a) be half
 b) be double
 c) be four times
 d) not change
32. When a ferromagnetic material is heated above its Curie temperature
 a) it gets demagnetized
 b) it becomes diamagnetic
 c) behaves like a paramagnetic substance
 d) remains unaffected
33. A magnetic field exerts no force on
 a) a magnet
 b) an unmagnetised iron bar
 c) a moving charge
 d) a stationary charge
34. The ionization energy of hydrogen atom is 13.6 eV. The ionization energy of helium atom would be
 a) 13.6 eV
 b) 27.2 eV
 c) 6.8 eV
 d) 54.4 eV
35. In the nuclear reaction ${}_{92}\text{U}^{238} \rightarrow {}_Z\text{Th}^A + {}_2\text{He}^4$, the values of A and Z are
 a) A=234, Z=94
 b) A=234, Z=90
 c) A=238, Z=94
 d) A=238, Z=90
36. The number of moles of KCl in 1000 ml of 2 molar solution is
 a) 1
 b) 2
 c) 100
 d) 18
37. The osmotic pressure of a solution is given by the relation
 a) $\pi = ST/C$
 b) $\pi = CT/S$
 c) $\pi = SC/T$
 d) $\pi/C = ST$
38. The amount of KMnO_4 required for preparing 100 ml of 0.1 N solution in alkaline medium is
 a) 1.58 g
 b) 3.16 g
 c) 0.52 g
 d) 0.31 g
39. Which of the following 0.1M aqueous solution will have the lowest freezing point?
 a) Potassium sulphate
 b) Sodium chloride
 c) Urea
 d) Glucose
40. Which of the following metals can deposit copper from copper sulphate solution?
 a) Mercury
 b) Iron
 c) Gold
 d) Platinum
41. Which of the following is the least basic?
 a) NH_3
 b) $\text{C}_6\text{H}_5\text{NH}_2$
 c) $(\text{C}_6\text{H}_5)_3\text{N}$
 d) $(\text{C}_6\text{H}_5)_2\text{NH}$
42. When a solid melts, there is
 a) no change in enthalpy
 b) increase in enthalpy
 c) decrease in enthalpy
 d) decrease in entropy
43. In a spontaneous change, a system undergoes
 a) lowering of free energy
 b) lowering of entropy
 c) increase in internal energy
 d) no energy change
44. Which of the following properties of liquids does not decrease with rise in temperature?
 a) vapour pressure
 b) viscosity
 c) surface tension
 d) density
45. Colloidal particles exhibit Tyndall effect due to
 a) Polarization of light
 b) Scattering of light
 c) Reflection of light
 d) Refraction of light

46. Specific amino acids are picked from the cellular pool for protein synthesis by
 a) mRNA
 b) rRNA
 c) tRNA
 d) snRNA
47. A gene which shows its effect on more than one character is called
 a) Polymorphic
 b) Pleiotropic
 c) Polygenic
 d) Multigenic
48. Which one of the following is dominant in humans?
 a) Albinism
 b) Rh factor
 c) Haemophilia
 d) Colour blindness
49. An individual having two identical alleles for a character is called
 a) Homozygote
 b) Heterozygote
 c) Hybrid
 d) None of these
50. ABO blood grouping is based on
 a) Codominance
 b) Incomplete dominance
 c) Epistasis
 d) Multiple allelism
51. The genotype of a B- blood group father of an O-blood group child would be
 a) $I^B i$
 b) $I^B I^B$
 c) $I^A I^B$
 d) $i i$
52. Natural rubber is a polymer of
 a) Butadiene
 b) Ethylene
 c) Isoprene
 d) Styrene
53. In the reaction ${}_3\text{Li}^6 + (?) \rightarrow {}_2\text{He}^4 + {}_1\text{H}^4$, the missing particle is
 a) Electron
 b) Neutron
 c) Proton
 d) Deuteron
54. In physical adsorption, attraction between adsorbent and adsorbate is due
 a) van der Waals forces
 b) Electrical forces
 c) Chemical bond forces
 d) None of these
55. If a strip of copper metal is placed in a solution of ferrous sulphate
 a) Cu will precipitate out
 b) Fe will precipitate out
 c) Cu and Fe both will be dissolved
 d) no reaction will place
56. Radioactive decay is a reaction of
 a) First order
 b) Second order
 c) Third order
 d) Zero order
57. When viewed in white light, a soap bubble shows colours because of
 a) Scattering
 b) Dispersion
 c) Diffraction
 d) Interference
58. Time taken by sunlight to pass through a window of thickness 4 mm whose refractive index is $\frac{3}{2}$ is
 a) 2×10^{-4} sec
 b) 2×10^8 sec
 c) 2×10^{-11} sec
 d) 2×10^{11} sec
59. The phenomenon responsible for the blue colour of the sky is
 a) Scattering
 b) Refraction
 c) Reflection
 d) Dispersion
60. It is possible to observe total internal reflection when a ray travels from
 a) Air to water
 b) Air to glass
 c) Water to glass
 d) Glass to water
61. An oil immersion type objective of a microscope shows better details because of
 a) high magnifying power
 b) high resolving power
 c) large numerical aperture
 d) none of these

62. A concave mirror has radius of curvature of 0.2 m. Its focal length is
 a) - 0.2 m
 b) 0.1 m
 c) + 0.1 m
 d) 0.4 m
63. Antibodies fight against
 a) infection
 b) thirst
 c) starvation
 d) stress
64. Pyrolysis of wood produces
 a) Charcoal, gas & oil
 b) Charcoal & oil
 c) Charcoal
 d) Producer gas
65. The enzyme Ribulose biphosphate carboxylase-oxygenase occurs in
 a) Chloroplasts
 b) Golgi complex
 c) Peroxisomes
 d) Mitochondria
66. Nucleus does not occur in
 a) Sieve tubes
 b) Tracheids
 c) Vessel elements
 d) All of these
67. A cross yielded 45 tall and 15 dwarf plants. Genotypes of the parents would be
 a) TT x tt
 b) TT x TT
 c) TT x Tt
 d) Tt x Tt
68. Which one of the following is a polygenic inheritance in humans?
 a) Sickle cell anaemia
 b) Skin colour
 c) Colour blindness
 d) Phenylketonuria
69. The first scientific study leading to formulation of laws of heredity was carried out by
 a) Darwin
 b) Mendel
 c) Lamarck
 d) Bateson
70. In sickle cell syndrome the amino acid substituted is
 a) glutamic acid by valine in α -chain
 b) valine by glutamic acid in α -chain
 c) glutamic acid by valine β -chain
 d) valine by glutamic acid in β -chain
71. Dihybrid cross is connected with the principle of
 a) Purity of gametes
 b) Dominance
 c) Segregation
 d) Independent assortment
72. Which of the following was not propounded by Mendel
 a) Dominance
 b) Incomplete dominance
 c) Independent assortment
 d) Segregation
73. A human ovum contains
 a) one X chromosome
 b) XY chromosomes
 c) XX chromosomes
 d) one Y chromosome
74. Meningitis is caused by
 a) virus
 b) bacteria
 c) fungus
 d) none of these
75. Which kind of disease is Down Syndrome?
 a) autosomal
 b) sex linked
 c) viral
 d) bacterial
76. Which of the following are absent in erythrocytes?
 a) Nucleus
 b) Aerobic respiration
 c) DNA
 d) All of these
77. Which industry depends on the knowledge of wood anatomy?
 a) Plywood industry
 b) Oil industry
 c) Paper industry
 d) all of these

78. The boiling point of a solvent containing a non-volatile solute
 a) is depressed
 b) is elevated
 c) does not change
 d) none of these
79. Cinnabar is an ore of
 a) Mercury
 b) Zinc
 c) Copper
 d) Silver
80. The process of extracting metal from its ore is called
 a) Metallurgy
 b) Refining
 c) Concentration
 d) Leaching
81. What is the maximum number of hydrogen bonds in which a water molecule may participate?
 a) 1
 b) 2
 c) 3
 d) 4
82. In general for exothermic reaction to be spontaneous
 a) temperature should be high
 b) temperature should be zero
 c) temperature should be low
 d) temperature has no effect
83. The angle between the vectors $\mathbf{i} + 2\mathbf{j} + \mathbf{k}$ and $-\mathbf{i} + \mathbf{j} + \mathbf{k}$ is
 a) 90°
 b) 60°
 c) 0°
 d) 45°
84. The value of $x + 1/x$ where x is a positive real number is
 a) >1
 b) ≥ 1
 c) > 2
 d) ≥ 2
85. The value of $\log_{10} 50 + \log_{10} 2$ is
 a) 1
 b) 0
 c) 2
 d) None of the above
86. The area of the triangle whose vertices are (1,0), (2,2), (3,0) is
 a) 2 units
 b) 1 unit
 c) 3 units
 d) $\sqrt{3}/2$ units
87. Wastage of energy is associated with
 a) Photorespiration
 b) Photosynthesis
 c) Glycolysis
 d) Krebs cycle
88. The site of light reaction of photosynthesis is
 a) Granum
 b) Stroma
 c) Unit membrane
 d) Lamellae
89. The common requirement of photosynthesis and respiration is
 a) Cytochromes
 b) Mitochondria
 c) Green cells
 d) Sunlight
90. Phyllode is a modification of
 a) Petiole
 b) Leaf bases
 c) Root
 d) Stem