ST. ANTHONY'S COLLEGE, SHILLONG

ENTRANCE TEST FOR ADMISSION INTO GRADUATE PROFESSIONAL COURSES
2006

BIOTECHNOLOGY
(Part A)

DATE	:	10 May 2006
TIME	:	9.30 am
DURATION	:	1 hour 30 minutes

INSTRUCTIONS

- There are 150 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

- For questions in Part A, each correct answer carries one mark. For each wrong answer .25 mark will be deducted. For questions in Part B, each correct answer carries two marks and for each wrong answer .25 mark will be deducted.

- 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.

- The required rough work may be done on the sheet that is provided for the purpose.

- 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.

1. The electronic configuration of sodium is
   a) $1s^2 2s^2 2p^6$
   b) $1s^2\ 2s^2 2p^6 3s^2$
   c) $1s^2\ 2s^2\ 2p^6 3s^1$
   d) $2s^2 1p^6 2s^2$

2. Select the correct statement:
   a) Weight of a body is less inside the earth than at the surface.
   b) Weight of a body is higher inside the earth than at the surface.
   c) Weight of a body will remain the same inside the earth and at the surface.
   d) None of these.

3. A body starts from rest and falls freely under the action of gravity, the distance covered by it in the two seconds is:
   a) 9.8 m
   b) 19.6 m
   c) 4.9 m
   d) 19 m

4. If the time displacement graph of a particle is parallel to the time axis, what will be the velocity of the particle
   a) zero
   b) two
   c) one
   d) three

5. Temperature in the Celsius scale corresponding to 98.4°F is given by:
   a) 36.89°C
   b) 37°C
   c) 42°C
   d) 50°C

6. The noble gases are
   a) He, Ne, Ar, Xe, F, At
   b) He, Ne, Ar, I, Li, At
   c) He, Ne, Ar, Kr, Xe, Rn
   d) Au, Ag, Ne, Kr, At

7. The substances forming true solutions are called
   a) Crystalloids
   b) Toluene
   c) Colloids
   d) Solutes

8. Tyndall effect is not shown by
   a) Colloidal solution
   b) Crystalline solution
   c) True solution
   d) Clear solution

9. The TCA cycle occurs in:
   a) Ribosomes
   b) Mitochondria
   c) Grana
   d) Endoplasmic Reticulum

10. Food in birds is churned in
    a) Beak
    b) Intestine
    c) Gizzard
    d) Pharynx

11. Animals which live on the floor of sea are called
    a) Benthic
    b) Pelagic
    c) Planktonic
    d) Terrestrial

12. Which of the following consists of the largest number of animals?
    a) Annelida
    b) Mollusca
    c) Arthropoda
    d) Cnidaria

13. A gregarious but non-social animal is
    a) Ant
    b) Locust
    c) Honey bee
    d) Wasp

14. Ticks and mites belong to:
    a) Insecta
    b) Crustacea
    c) Arachnida
    d) Diplopoda

15. Total organic matter present in an ecosystem is called
    a) Biomass
    b) Biome
    c) Litter
    d) Biotic Community

16. The marine ecosystem with maximum productivity
    a) Open sea
    b) Coastal region
    c) Estuaries
    d) None of these

17. When biosphere turns into human dominated environment, it is called:
    a) Troposphere
    b) Mesophere
    c) Noosphere
    d) Thermosphere

18. Which of the following relates to photons both as wave motion and as a stream of particles?
    a) Interference
    b) E=mc2
    c) Diffraction
    d) E = hv

19. Which of the following molecule shows intramolecular hydrogen bonding?
    a) phenol
    b) benzoic acid
    c) p-nitrophenol
    d) salicylaldehyde

20. Which of the following has the lowest boiling point?
    a) H_2O
    b) H_2S
    c) H_2Se
    d) H_2Te

21. What is the maximum number of hydrogen bonds in which a water molecule may participate?
    a) 1
    b) 2
    c) 3
    d) 4

22. Chemical messengers produced in ductless glands are called
    a) Antibodies
    b) Hormones
    c) Glycine
    d) Proteins

23. Nylon is a
    a) polyamide
    b) polyester
    c) polysaccharide
    d) vinyl polymer

24. Maleic acid and fumaric acid are forms of
    a) Chain isomers
    b) Conformations
    c) Geometrical isomers
    d) Optical isomers

25. Which of the following can exist in optically active form
    a) 1-butanol
    b) 2-butanol
    c) 3-pentanol
    d) 4-heptanol

26. The half life period for a first order reaction is 69.3 s. its rate constant is:
    a) $10^{-2}s^{-1}$
    b) $10^{-4}s^{-1}$
    c) $10\ s^{-1}$
    d) $10^2\ s^{-1}$

27. A larger increase in reaction rate with small rise in temperature is due to
    a) increase in number of activated molecules
    b) increase in number of collisions
    c) lowering of activation energy
    d) shortening of mean free path

28. Which of the following are paramagnetic?
    a) TiO
    b) VO
    c) CuO
    d) Mn_2O_3

29. A car is moving on a road when rain is falling vertically downwards. Select the correct answer from the following:
    a) Rain will strike the hind screen only.
    b) Rain will strike the front screen only.
    c) Rain will strike both screens
    d) None of these.

30. The first stable product of glycolysis is
    a) Pyruvate
    b) fructose 1,6-bisphosphate
    c) Glucose-6 Phosphate
    d) Phosphoenol Pyruvate.

31. The net yield of ATP per glucose molecule during glycolysis is
    a) 1 ATP
    b) 2 ATP
    c) 3 ATP
    d) 4 ATP

32. Mannose, galactose and Fructose can enter the glycolytic pathway
    a) Yes
    b) No
    c) Only mannose can
    d) Only Fructose can.

33. During fermentation of pyruvate ,the net ATP yield is
    a) 0(zero) ATP
    b) 1ATP
    c) 2ATP
    d) 3ATP.

34. From the six carbon atoms of a glucose molecule, the number of carbon atoms that enter the Citric Acid Cycle after glycolysis is
    a) 1 C
    b) 2C
    c) 3C
    d) 4C.

35. The tricarboxylic acid in the Tricarboxylic Acid Cycle (TCA Cycle) after which it was named is
    a) malate
    b) Fumarate
    c) alpha – Ketoglutarate
    d) Citrate.

36. The blue blood of insects is due to the presence of
    a) Haemoglobin
    b) Haemocyanin
    c) Melanin.
    b) None of the above.

37. The main pathway of fatty acid breakdown is
    a) Glycolysis
    b) beta –Oxidation
    c) Citric acid cycle
    d) Glyoxylate cycle.

38. The Pentose Phosphate pathway generates the reductant
    a) NADH
    b) NADPH
    c) $FADH_2$
    d) $FMNH_2$

39. The hydrogen bonding pairs found in DNA are
    a) AT, GC
    b) AG, TC
    c) AC, GT
    d) All are possible.

40. Extracellular materials are taken inside the cell by invagination of a segment of plasma membrane by:
    a) exocytosis
    b) osmosis
    c) active transport
    d) endocytosis

41. The electron transport chain of mitochondria is present in the
    a) matrix
    b) intermembrane space
    c) inner membrane
    d) outer membrane

42. Transport of proteins from cytoplasm to the plasma membrane is done by
    a) endoplasmic reticulum
    b) lysomes
    c) golgi bodies
    d) peroxisomes

43. In plant cells the storage organelle is known as
    a) endosome
    b) thylakoid
    c) phagosome
    d) vacuole

44. The type of muscles used in walking is known as
    a) smooth muscles
    b) skeletal muscles
    c) motile muscles
    d) cardiac muscle

45. Axons of nerve cells conduct an electric impulse known as
    a) sensory signal
    b) membrane potential
    c) action potential
    d) axon excitation

46. ATP is required in
    a) Active transport
    b) Passive transport
    c) Diffusion
    d) None of these.

47. In animals the site for storage of fat is
    a) liver
    b) adipose tissue
    c) melanocytes
    d) mucosal cells

48. rRNA is synthesized in
    a) nucleolus
    b) ribosome
    c) golgi bodies
    d) endoplasmic reticulum

49. Heritable changes in DNA is called
    a) transcription
    b) translation
    c) replication
    d) mutations

50. The protein constituent of hair and nails is
    a) fibroin
    b) keratin
    c) β-carotene
    d) collagen

51. The most abundant enzyme in the biosphere is
    a) Hexokinase
    b) Catalase
    c) Rubisco
    d) Peroxidase

52. Sex chromosome may be defined as
    a) Sat chromosomes
    b) X-chromosomes
    c) Y-chromosome
    d) Chromosome concerned with sex determination

53. Genes are located on:
    a) Nucleosome
    b) chromosome
    c) Ribosome
    d) centrosomes

54. The carbohydrates contain:
    a) –OH group
    b) -CHO group
    c) C=O group
    d) All of these

55. True nucleus is absent in:
    a) Bacteria
    b) Green algae
    c) Fungi
    d) Lichens

56. Genes involved in cancer are:
    a) Tumour genes
    b) Oncogenes
    c) Cancer genes
    d) Regulator genes

57. Which one of the following organs in the human body is most affected due to shortage of oxygen
    a) Kidney
    b) Brain
    c) Intestine
    d) Skin

58. The most conclusive evidence for paternity of a child can be:
    a) blood grouping
    b) genetic trait analysis
    c) DNA fingerprinting
    d) None of these

59. Which one of the following enzymes is present in saliva:
    a) pepsin
    b) Ptyalin
    c) Trypsin
    d) Chymotrypsin

60. Goiter is caused due to the deficiency of:
    a) Calcium
    b) Iodine
    c) Fluorine
    d) Phosphorus

61. Which of the following is a protein deficiency disease:
    a) Cirrhosis
    b) Night blindness
    c) Eczema
    d) Kwashiorkor

62. In chromosomes, the DNA forms a complex with
    a) fatty acids
    b) Sphingolipids
    c) Histones
    d) Heparin

63. Dark reactions occur in the:
    a) Grana
    b) Stroma
    c) ER
    d) Cytoplasm

64. The bye-product of photosynthesis is:
    a) Carbon dioxide
    b) Oxygen
    c) Energy
    d) Potential Energy

65. How many spectral lines are produced in the spectrum of the hydrogen atom from the 5th energy level:
    a) 5
    b) 10
    c) 15
    d) 4

66. Which of the following orbital designations is not correct corresponding to quantum numbers
    a) n=5, l=2----------5d
    b) n=2, l=0---------2s
    c) n=4, l=3----------4f
    d) n=7, l=2---------7p

67. The energy of an electron in the 1st Bohr orbit of hydrogen is -13.6eV. The possible value of the excited state(s) for electrons in Bohr Orbit(s) of hydrogen is(are):
    a) -3.4eV
    b) -4.2eV
    c) -6.8eV
    d) +6.8eV

68. The radial part of wave function depends on the quantum numbers:
    a) n,l
    b) n only
    c) l,m
    d) l only

69. Which of the following molecule shows intramolecular hydrogen bonding?
    a) phenol
    b) benzoic acid
    c) p-nitrophenol
    d) salicylaldehyde

70. How many orbitals are allowed in the sub-shell if angular momentum quantum number for electrons in that subshell is 3
    a) 1
    b) 3
    c) 5
    d) 7

71. The number of atoms in bcc arrangements is:
    a) 1
    b) 2
    c) 4
    d) 6

72. Edge length of face centred cubic unit cell is 508pm. If the radius of the cation is 110pm, the radius of the anion is
    a) 144pm
    b) 288pm
    c) 628pm
    d) 398pm

73. An example of a body centred cube is
    a) Na
    b) Mg
    c) Zn
    d) Cu

74. The number of moles of NaCl in 3 litres of 3M solution is:
    a) 1
    b) 3
    c) 9
    d) 27

75. Which of the following is not a colligative property?
    a) Depression in freezing point
    b) Elevation in boiling point
    c) Optical activity
    d) relative lowering in vapour pressure

76. Two solutions A and B are separated by a semipermeable membrane. If the solvent flows from A to B, then
    a) A is more concentrated than B
    b) A is less concentrated than B
    c) A and B are of the same concentration
    d) Both A and B get diluted

77. Regardless of the atmospheric pressure, the boiling of a solution as compared to that of pure solvent is:
    a) lower
    b) higher
    c) same
    d) none of these

78. The zigzag motion of colloidal particles was first observed by
    a) John Tyndall
    b) Robert Brown
    c) Zsigmondy
    d) Ostwald

79. The number of phases in a colloidal system is
    a) 1
    b) 2
    c) 3
    d) 4

80. Soaps essential form a colloidal solution in water and remove the greasy matter by
    a) coagulation
    b) emulsification
    c) adsorption
    d) absorption

81. Out of all the halogens hydra acids, the weakest is
    a) HI
    b) HBr
    c) HF
    d) HCl

82. Which of the following halogens has some metallic character
    a) F
    b) Cl
    c) Br
    d) I

83. Which metal is present in brass, bronze and german silver?
    a) Zn
    b) Fe
    c) Al
    d) Cu

84. An alpha particle is:
    a) an electron
    b) a proton
    c) a positron
    d) a helium nucleus

85. The property which regularly increases down the group in the periodic table is
    a) ionization enthalpy
    b) electronegativity
    c) reducing nature
    d) electron gain enthalpy

86. The correct order of increasing radii of the following set of elements (Na,Rb,K and Mg) is:
    a) Mg,Na,K,Rb
    b) Mg,K,Na,Rb
    c) Na,K,Rb,Mg
    d) Na,Rb,K,Mg

87. The penetration of the electrons in any principal shell varies as:
    a) $s>p>d>f$
    b) $s<p<d<f$
    c) $s>p<d>f$
    d) $s<p>d>f$

88. Born Haber cycle can be used to calculate
    a) lattice energy of ionic crystals
    b) electron affinity of elements
    c) heats of formation of ionic crystals
    d) all the above

89. Which of the following is most ionic?
    a) NaCl
    b) KCl
    c) FeCl
    d) $CaCl_2$

90. Reduction involves:
    a) gain of electrons
    b) addition of oxygen
    c) increase in oxidation number
    d) loss of electrons

91. The increasing electron releasing tendencies of Cu, Ag, Fe, Zn are in the order
    a) Ag, Cu, Fe, Zn
    b) Cu, Ag, Fe, Zn
    c) Zn, Cu, Fe, Ag
    d) Fe, Zn, Cu, Ag

92. Beryllium exhibits diagonal relationship with
    a) Boron
    b) Aluminium
    c) Magnesium
    d) Silicon

93. Radioactive isotope of hydrogen is
    a) Hydrogen
    b) Protium
    c) Deuterium
    d) Tritium

94. The oxidation number of oxygen in hydrogen peroxide is
    a) +1
    b) -1
    c) +2
    d) -2

95. The Gaussian surface for calculating the electric field due to a charged distribution is
    a) Any closed surface around the charge distribution
    b) Any surface near the charge distribution
    c) A spherical surface
    d) A symmetrical closed surface at every point of which electric field has a single fixed value

96. When an electric dipole is placed in a uniform electric field, it experiences
    a) A force as well as a torque
    b) A torque but no force
    c) A force but no torque
    d) Neither a force nor a torque

97. Increasing the charge on the plates of a capacitor means
    a) Increasing the capacitance
    b) Increasing the potential difference between the plates
    c) Both
    d) None

98. Ampere hour is the unit of
    a) Quantity of charge
    b) Strength of current
    c) Power
    d) Energy

99. As the temperature of a conductor increases, its resistivity and conductivity change. The ratio of resisitivity to conductivity
    a) increases
    b) decreases
    c) remains constant
    d) may increase or decrease depending on the actual temperature

100. Four resistances of equal length and of resistance 10 ohm each are connected in the form of a square. The equivalent resistance between two opposite corners of the square is
    a) 2.5 ohm
    b) 10 ohm
    c) 20 ohm
    d) 40 ohm

101. The specific resistance of a conductor increase with
    a) increase in temperature
    b) increase in cross section area
    c) decrease in cross section area
    d) increase in cross section and decrease in length

102. The wavelength of the matter wave is independent of
    a) mass
    b) velocity
    c) momentum
    d) charge

103. In order to increase the kinetic energy of ejected photoelectrons, there should be an increase in the
    a) intensity of radiation
    b) wavelength of the radiation
    c) frequency of radiation
    d) both the wavelength and intensity of radiation

104. Proton and an alpha particle have the same de-Broglie wavelength. What is same for both of them
    a) time period
    b) energy
    c) frequency
    d) momentum

105. The valence electron in alkali metal is a
    a) f-electron
    b) p-electron
    c) s-electron
    d) d-electron

106. The mass number of a nucleus is equal to the number of
    a) electrons it contains
    b) protons it contains
    c) neutrons it contains
    d) nucleons it contains

107. When an electron jumps from the fourth orbit to the second orbit, one gets the
    a) second line of Paschen series
    b) second line of Balmer series
    c) first line of Pfund series
    d) second line of the Lyman series

108. As the mass number A increases, which of the following quantities related to a nucleus do not change?
    a) binding energy
    b) density
    c) volume
    d) mass

109. According to kinetic theory of gases at absolute zero of temperature,
    a) water freezes
    b) liquid Helium freezes
    c) molecular motion stops
    d) liquid hydrogen freezes

110. Attractive forces and size affects in the gas can be neglected at
    a) low pressure
    b) high pressure
    c) low pressure and high temperatures
    d) low temperatures and high pressures

111. Heating of water under atmospheric pressure is an
    a) isothermal process
    b) isobaric process
    c) adiabatic process
    d) isochoric process

112. The angle -975 degrees lies in the
    a) first quadrant
    b) second quadrant
    c) third quadrant
    d) fourth quadrant

113. In a class of 60 boys there are 45 boys who play cards and 30 boys play carroms. The number of boys who play both games is
    a) 15
    b) 20
    c) 25
    d) 40

114. There are 6 gentlemen and 4 ladies to dine at a round table. In how many ways can they seat themselves that no 2 ladies are together
    a) 43200
    b) 42300
    c) 2300
    d) 45200

115. The number of ways in which 7 dissimilar things can be arranged in a line is
    a) 5060
    b) 5040
    c) 6090
    d) 3070

116. The sum of 40 terms of an A.P. whose first term is 2 and common difference is 4 will be
    a) 3200
    b) 1600
    c) 200
    d) 2800

117. The vectors are equal if
    a) their length(magnitudes) are equal
    b) they have same or parallel support
    c) They have same sense
    d) all

118. The number of amino acids used in protein synthesis is
    a) 20
    b) more than 50
    c) more than 100
    d) 35

119. Iodine test is used to detect
    a) fats
    b) carbohydrates
    c) malaria
    d) typhoid

120. In a gamete there will be
    a) one pair of sex chromosome
    b) only one sex chromosome
    c) no sex chromosome
    d) only autosomes