ST. ANTHONY'S COLLEGE
SHILLONG

ENTRANCE TEST FOR ADMISSION INTO
UNDER GRADUATE
PROFESSIONAL COURSES
2009

BIOTECHNOLOGY

DATE : THURSDAY, 7TH MAY, 2009
TIME : 9:30 AM
DURATION: 1 HOUR 30 MINUTES

INSTRUCTIONS

- This test has two parts. Part A and B.
- For each question you may select only ONE answer. Selecting more than one option qualifies as a wrong answer. You can use a pen/pencil for answering the questions.
- Each correct answer in Part A and B carries a weightage of 1 mark while a wrong answer carries a penalty of – 0.25.
- Part A has a total of 50 multiple choice questions. Question 1- 50 of Part A is to be answered on the answer sheet provided to you and must be returned back at the conclusion of this test.
- Part B has a total of 40 questions. These questions are to be answered on the question paper itself, in the space provided.
- Write the Roll Number given on your Admit Card in the answer sheet and question paper in the space provided.
- Please preserve your admit cards. They will be required at the time of admission.
- The admit card numbers of those shortlisted for admission on the basis of this entrance test will be published on the college notice boards and on the college web site on 11th May, 2009.
- 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

(1 mark will be awarded for every correct answer, 0.25 will be deducted for every wrong answer)

Directions for questions 1 – 50:

Choose the best answer in each of the following:

1. The following is a chromosomal disorder:

   a. Albinism
   b. Down's syndrome
   c. Phenylketonuria
   d. Sickle-cell anemia

2. Which of the following statements is correct?

   a. Both phenotype and genotype change during the development of an organism.
   b. Phenotype changes during the development of an organism but genotype remains relatively constant
   c. Genotype changes during development of an organism but phenotype remains relatively constant
   d. Both phenotype and genotype do not change during development of an organism.

3. In a family, the mother has the genotype A1A1B1B1, the father has genotype A1A2B1B2. The four children have the following genotypes: A1A1B1B1, A1A1B1B1, A1A2B1B2 and A1A1B1B2. The recombination frequency in the family is:

   a. 5 %
   b. 10 %
   c. 25 %
   d. 50 %

4. In the ABO blood group system, if the I^A allele produces the A phenotype and the allele I^B produces the B phenotype, an individual having alleles $I^A I^B$ will have:

   a. Blood group AB because the alleles I^A and I^B are co-dominant
   b. Blood group A because the alleles I^A and I^B are co-dominant
   c. Blood group A because the allele I^A is dominant over allele I^B
   d. Blood group B because the allele I^B is dominant over allele I^A

5. The ΔG^0 values of sequential chemical reactions are:

   a. zero
   b. additive
   c. subtractive
   d. constant

6. Burkitt's lymphoma develops due to a translocation involving:

   a. A housekeeping gene
   b. A pseudogene
   c. A lethal gene
   d. An oncogene

7. The distance between genes A and B is 0.1 cM, while distance between genes B and C is 1cM. Which of the following statements is about recombination frequency is correct?

   a. Greater between A and B than between B and C.
   b. Smaller between A and B than between B and C.
   c. Cannot be determined between the genes.
   d. Not related to the distance between the genes

8. An ester used as medicine is:

   a. ethyl acetate
   b. methyl acetate
   c. methyl salicylate
   d. ethyl benzoate

9. Hemophilia A is a disorder which:

   a. is not heritable
   b. may be inherited from a mother suffering from hemophilia
   c. may be inherited from a father suffering from hemophilia
   d. may be inherited only when both parents suffer from hemophilia

10. Pantothenic acid is:

    a. Vit B_1
    b. Vit B_2
    c. Vit B_3
    d. Vit B_{12}

11. The ultimate source of electrons in chloroplasts is:

    a. O_2
    b. CO_2
    c. H_2O
    d. Fe^{2+}

12. When succinate is the acceptor of electrons in the mitochondrial respiratory chain one of the following is bypassed:

a. Complex I
b. Complex II
c. Complex III
d. ATP synthase

13. The ribosomes are located on:

a. the outer surface of the cisternae of the smooth endoplasmic reticulum
b. the inner surface of the cisternae of the smooth endoplasmic reticulum
c. the outer surface of the cisternae of the rough endoplasmic reticulum
d. the inner surface of the cisternae of the rough endoplasmic reticulum

14. The nucleus is made up of:

a. Nucleoli
b. Euchromatin
c. Heterochromatin
d. Both euchromatin and heterochromatin

15. The following organelles in the cytoplasm are bounded by membrane:

a. Mitochondria, chloroplasts, lysosomes and peroxisomes
b. Mitochondria, chloroplasts and peroxisomes
c. Mitochondria, chloroplasts, endoplasmic reticulum and golgi complex
d. Endoplasmic reticulum, golgi complex, lysosomes and peroxisomes

16. Centrioles are required for spindle formation in:

a. Animal cells
b. Bacterial cells
c. Plant cells
d. Animal and Plant cells

17. Which of the following is chiral in nature:

a. $CH_3CH(OH)CH_3$
b. $CH_3CH(OH)C_2H_5$
c. CH_3CH_2OH
d. $CH_3CH(OCH_3)CH_3$

18. The trilaminar structure and bilayer structure of the plasma membrane are proposed by the:

a. Unit membrane model
b. Fluid mosaic model
c. Unit membrane model and Fluid mosaic model respectively
d. Fluid mosaic model and Unit membrane model respectively

19. Plasmids are found in:

a. All bacteria
b. Some bacteria
c. All animal and plant cells
d. Some animal and plant cells

20. The Golgi complex is made up of units known as:

a. Episomes
b. Liposomes
c. Lysosomes
d. Dictyosomes

21. Electron transport functions in the:

a. Outer mitochondrial membrane
b. Intermembrane space matrix
c. Inner mitochondrial membrane
d. All of these

22. Which amino acid does not exist as D- and L- optical isomers?

a. Glycine
b. Proline
c. Histidine
d. None of these

23. The factors of the expression $a^2b^3 + a^3b^2$ are:

a. x^3y^3 (y- 2x)
b. $a^2b^2(b+a)$
c. ab
d. a(b+c)

24. If a + b = 5 and ab = 6, the value of $a^3 + b^3$ is

a. 31
b. 40
c. 35
d. 33

25. Which one of the following compounds is not a di- or polysaccharide with at least one glucose unit in it?

a. Mannose
b. Lactose
c. Sucrose
d. Amylose

26. The value of 3m - 5n + 6q + r, when m = 4, n = 6, q = 2, r = - 8 is:

a. 14
b. 13
c. 20
d. – 14

27. During cleavage, the zygote undergoes:

a. No division
b. Only nuclear division
c. Both nuclear and cytoplasmic division
d. Only cytoplasmic division

28. The Circadian rhythm is regulated by:

a. Hypothalamus
b. Adrenal Medulla
c. Gonads
d. Pineal body

29. The roots of the equation $4x^2 - 4x = 80$ are:

a. 2, 4
b. 5, -4
c. 19, 21
d. 4, -13

30. The final temperature in an adiabatic expansion is:

a. greater than the initial temperature
b. less than the initial temperature
c. same as the initial temperature
d. half of the initial temperature

31. The product of the $5mn^6$ and $-8m^7n$ is:

a. $21m^7n^8$
b. $-40m^7n^6$
c. $-40m^8n^7$
d. $-40m^6n^5$

32. Which one of the following statements is false?

a. Work is a state function
b. Temperature is a state function
c. Work appears at the boundary of the system
d. The entropy in the universe is continuously increasing

33. Which of the following features highlight the differences between B-DNA and Z-DNA?

a. Double helical nature
b. A -T & G-C pairing
c. Orientation of the sugar-phosphate backbone
d. Anti-parallel nature of the two polynucleotide strands of the double helix.

34. The experimental proof that DNA replicates semiconservatively was given by:

a. Frederick Griffith
b. Har Gobind Khorana
c. James D. Watson and Francis H. Crick
d. Matthew Messelson and Frank W. Stahl

35. Which of the following is NOT involved in Translation?

a. Ribosome
b. RNA polymerase
c. mRNA
d. tRNA

36. Neutrons are present in all atoms except:

a. He
b. C
c. H
d. Ne

37. Ionic reactions are usually very fast because:

a. the energy of interaction between charged ions is greater than between neutral molecules.
b. it does not involve bond breaking
c. the number of collisions between ions per unit volume per second are very large
d. these reactions are highly exothermic

38. A magnetic needle placed in a non-uniform magnetic field experiences:

a a force and a torque
b. a force but not a torque
c. torque but not a force
d. neither a force nor a torque

39. A zero order reaction is one:

a. in which reactants do not react
b. in which one of the reactants is in large excess
c. whose rate is not affected with time
d. whose rate increases with time

40. The designation of an orbital with n = 4 and l = 3 is:

a. 4s
b. 4p
c. 4d
d. 4f

41. Which of the following molecules is not an exception to the octet rule?

a. BF_3 b. PF_5
c. CO_2 d. IF_7

42. A compound with no tertiary hydrogen is:

a. $(CH_3)_2CHCH_2CH_2CH_3$ b. $(CH_3)_3CCH_2CH_3$
c. $(CH_3)_3CCH(CH_3)_2$ d. none of these

43. If a ideal gas undergoing isothermal expansion:

a. its heat content remains constant
b. its pressure remains constant
c. its temperature remains constant
d. its temperature and heat remain constant

44. The First Law of Thermodynamics confirms the Law of:

a. Conservation of Momentum b. Conservation of Energy
c. Conservation of Mass d. Conservation of Electricity

45. The occurrence of a reaction is impossible if:

a. ΔH is positive, ΔS is also positive
b. ΔH is negative, ΔS is also negative
c. ΔH is positive, ΔS is negative
d. ΔH is negative, ΔS is positive

46. When a particle in motion is always acted upon by a force in a direction perpendicular to the direction of motion , the path followed by the particle will be:

a. elliptical b. circular
c. straight line d. hyperbolic

47. Three elements A, B and C have reduction potentials -1.5, -0.05 and 1.5. The correct order of their reducing power is:

a. B>A>C b. A>B>C
c. C>B>A d. B>C>A

48. If the normal force is doubled, the coefficient of friction is:

a. doubled b. not changed
c. halved d. tripled

49. A ball is allowed to fall from a height of 10m. if there is a 40% loss of energy due to impact, then after one impact the ball will bounce upto:

a. 10m b. 4m
c. 8m d. 6m

50. A person cannot see objects clearly beyond 50 cm. the power of the lens to correct the vision is:

a. +5 dioptres b. -2 dioptres
c. -0.5 dioptres d. +2 dioptres

Part B

(1 mark will be awarded for every correct answer, 0.25 will be deducted for every wrong answer)

Directions for questions 1 – 40

Fill in the Blanks:

1. A system which can exchange only energy but not matter with the surroundings is called a _____.
2. In animals the function of ductus choledochus is to carry _____.
3. The entropy of a gas _____ with increasing temperature.
4. When a charged particle moves through a magnetic field, it suffers a change in its _____.
5. An orbiting electron loses energy in the form of _____.
6. The voltage amplification factor of a triode depends on _____.
7. Phenotypes produced in a dihybrid cross are in the ratio _____.
8. When a gene pair in an organism contains two identical alleles, the organism is considered _____ for that gene pair.
9. The phenomenon of multiple phenotypic effects of a single gene is called _____.
10. The tetrasomic condition XXXY in males is known as _____ syndrome.
11. _____ are large chromosomes having many “threads” .
12. The _____ Theory states that all organisms are composed of similar units of organization, called cells.
13. The endoplasmic reticulum is involved in folding of _____.
14. The inner mitochondrial membrane is folded to form projections known as _____.
15. Karyokinesis is the process of division of the _____.
16. Nucleases are found in the _____ of a cell.
17. The total ATP yield after anaerobic fermentation of glucose to lactate is _____.
18. Deamination of amino acids gives their corresponding _____.
19. When an x-ray hits a proton and bounces back, its frequency _____.
20. In monocots grafting is almost impossible because they lack _____.
21. Albuminous seeds store reserve food materials in _____.
22. A chemical reaction whose rate depends on the concentration of one reactant only is referred to as _____ reaction.
23. The opening of flowers in with change in light intensity is a _____.
24. The colloidal dispersions of liquids in solid media are called _____.
25. The dual character of the electron was suggested by _____.
26. Stereoisomers that are non-superimposable mirror images of each other are called _____.

27. An equation relating the pH, p*K*a and the ratio of the concentrations of the proton acceptor (A^-) and proton donor (HA) species in a solution is called the _____ equation.

28. On heating $AgNO_3$ crystals strongly, we get _____.

29. The roots caps of some aquatic plants are replaced by _____.

30. Ozone is an allotrope of _____.

31. pOH of a solution is 10. The solution is _____.

32. Most of the fat digestions in animals occurs in _____.

33. Filtration of blood in the kidney occurs in the _____.

34. A solution of higher osmotic pressure than a reference solution is known as _____.

35. The half of ^{131}I is 8.04 days. The percentage of iodine sample left after two days is _____.

36. _____ are cells that secrete fibers in connective tissue.

37. Peripheral nervous system comprises cranial and _____ nerves

38. Oxygen is an element because it _____.

39. Proteins that associate with DNA to form chromosomes are called _____.

40. Daylight colour vision is provided by _____ cells.