THIS PAPER MUST BE HANDED IN

THE UNIVERSITY OF MELBOURNE

School of Agriculture and Food Systems

202-109 BIOLOGY FOR LAND AND FOOD RESOURCES

Reading Time 15 minutes
Writing Time 3 hours
This paper has twenty-three(23) pages.

STUDENT NO. .....

AUTHORISED MATERIALS

There are no authorised materials

INSTRUCTIONS TO INVIGILATORS

Candidates will receive the exam paper, a multiple choice question answer sheet and two small answer books.

Students may not remove the examination paper from the examination room.

INSTRUCTIONS TO STUDENTS:

1. This examination is divided into four sections; answer section **A** on the answer sheet provided, section **B** in the spaces within the examination paper and **C & D** separate examination booklets.

2. All questions are to be attempted.

3. Your Student number is to be written on the Answer Sheet and answer booklets in the space provided.

4. Answers must be written on the Multiple Choice Answer Sheet provided or in the space provided on the question page. On the Answer Sheet, it is advised that you use **PENCIL** to mark the appropriate places. Do not erase unless absolutely necessary.

5. Both the examination paper and the Answer Sheet and answer booklets must be left at your seat at the end of the test. The Answer Sheet is to be placed inside the examination paper.

Section A: Answer on answer sheet provided (55 Marks)

1 The biological reaction, which creates monomers from polymers, is called:

A dehydration
B condensation
C hypertrophy
D hydrolysis

2 The basic units or subunits of which a protein is composed are:

A fatty acids.
B polypeptide chains.
C amino acids.
D nucleic acids.

3 Nucleotide bases are compounds which:

A are the monmers of nucleic acids
B are the monomers of proteins
C act as enzymes in the activation of digestion
D are short polymers which have a high energy content

4 Glycogen is

A a building block of lipids
B a fatty acid
C a macromolecular carbohydrate
D a steroidal hormone

5 Which pairs of cells do NOT have identical chromosome numbers (in a species of plant)?

A egg and sperm
B spore mother cell and zygote
C spore and gamete
D spore and zygote

6 Microbial fermentation in certain parts of the digestive tract is useful because:

A it produces volatile fatty acids which can be absorbed and used as an energy source
B it produces glucose, which is essential for many energy requiring processes
C it consumes undesirable amino acids, which cause digestive, upsets
D it produces lactic acid which can be converted to Vitamin E

7 In which phase of the cell cycle does replication (duplication) of the DNA take place?

A interphase
B prophase
C metaphase
D anaphase

8 Large composite molecules such as glycoprotein, which are embedded in the phospholipids bilayer of the cell:

A may assist in transport of molecules into the cell
B may act as receptors for molecules such as hormones or neurotransmitters
C may act as antigens when present in another animal
D all of the above could be characteristics of glycoprotein

9 Junctions which form "holes" between animal cells and allow electrical and chemical communication are known as:

A desmosome junctions
B gap junctions
C tight junctions
D plasmodesmata junctions

10 An onion cell is placed in a hypotonic solution will
A become plasmolysed, as water leaves the cell by osmosis.
B burst, because water will enter the cell by osmosis.
C become crenate, as it shrivels.
D swell, because water will enter the cell by osmosis but the cell wall prevents bursting.

11 When crossing over in meiosis takes place, recombination of maternal and paternal genetic information may occur. Recombination of maternal and paternal genetic information occurs between

A autosomes and sex chromosomes.
B chromatids of non homologous chromosomes.
C sister chromatids of a chromosome.
D non sister chromatids of homologues.

12 The microtubules responsible for movement of the chromosomes on the spindle during mitosis and meiosis attach to the

A telomere of each chromosome.
B cell plate.
C phragmoplast.
D kinetochore of each chromosomes pair.

13 Which of the follow describes the state of the neuronal membrane when it is resting?

A The membrane is neutrally charged because the Na^+ on the outside balances the K^+ on the inside
B Both Na^+ and K^+ move rapidly from one side of the membrane to the other, causing an electromagnetic current
C The K^+ concentration is higher inside the cell and it tends to diffuse out of the cell, leaving the inside of the cell with a slightly negative charge
D The hydrophilic end of the membrane's phospholipids is turned outwards to reveal a positive charge

14 Ray tissue in woody stems have their function primarily in

A vertical conduction.
B food manufacture.
C waste storage.
D lateral conduction.

15 The rate of a chemical reaction can be affected by

A pH.
B temperature.
C the amount of enzyme present.
D all of the above.

16 Motor neurons:

A receive information from the environment
B pass information from neuron to neuron
C transmit information to muscles or other cells
D contract to withdraw limbs from a stimulus

17 Acetyl-CoA

A is a 3-C molecule which is the main input into the Citric Acid Cycle.
B is formed from pyruvate with the loss of CO2.
C acts as an enzyme to initiate the Citric Acid Cycle.
D is an intermediate electron acceptor on the inner mitochondrial membrane.

18 Fermentation

A only occurs in organisms restricted to anaerobic environments.
B uses NADH from glycolysis and regenerates NAD+ .
C is not found in plants.
D produces ATP from pyruvate.

19 With respect to plant hormones

A auxin always promotes growth.
B gibberellin retards mitosis and promotes cell differentiation.
C abscisic acid promotes seed dormancy.
D none of the above is correct.

20 In animals which are said to have a closed circulatory system:

A small openings called ostia allow body fluids to re-enter the heart
B no macromolecules can leave the circulating fluid
C the capillaries open into the body cavity
D the circulating fluid has a different composition from the inter-cellular fluid

21 In the circulatory system of mammals throughout the cardiac pumping cycle, the pressure in the:

A veins is always lower than in the ventricles
B aorta is the highest of all regions
C right atrium is always equal to the pressure in the right ventricle
D left atrium is always higher than the aorta

22 Plasmodesmata

A are a type of protein found in the extracellular matrix of animal cells.
B are responsible for plant cell cytokinesis.
C allow cell to cell communication between adjacent plant cells.
D are filled with extracellular fluids

23 The herbicide Roundup (glyphosate) disrupts lignin biosynthesis. Which of the following tissues or cell types will be most affected?

A Vascular cambium.
B Parenchyma.
C Collenchyma.
D Sclerenchyma

24 Which of the following is associated with breathing in mammals?

A negative pressure ventilation
B positive pressure ventilation
C one way ventilation
D bucal ventilation

25 Primary tissues are produced by

A secondary meristems.
B vascular cambium.
C cork cambium.
D apical meristems.

26 Alternate forms of the same trait (yellow seeds or green seeds) are called

A gene factors.
B homologous traits.
C alleles.
D chromosome traits.

27 The linear sequence of amino acids in a polypeptide chain is called the

A primary structure.
B secondary structure.
C quaternary structure.
D beta structure.

28 Tidal ventilation is:

A The extension of the rib cage to reduce air pressure in the thoracic cavity
B The contraction of the diaphragm muscle
C Under water respiration in amphibians
D The movement of air both into and out of gas exchanging tissue via a single opening is called

29 Which of the following use(s) a bucal force pump with intermittent tidal ventilation

A reptiles
B amphibians
C mammals
D all of the above

30 In order for parthenogenesis to occur:

A unfertilised eggs must become activated
B meiosis occurs without cytokinesis
C eggs must be fertilised
D none of the above are correct

31 Organisms which do not actively adjust their internal environment are called

A osmoconformers
B osmoregulators
C polyosmotic
D pseudoosmotic

32 With regard to sodium:

A it is actively reabsorbed into the blood in the nephrons
B it plays an important role in regulating blood volume
C it plays an important role in maintaining water balance
D all of the above are true statements about sodium

33 Groppledorf is a recessive trait, which affects rabbits and in the homozygous recessive form causes embryo mortality. The heterozygote rabbits have no tail. In a matings of ten females to one normal male rabbit, two offspring from one female rabbit had no tail. This suggests that:

A the mother of these offspring was a carrier but the male was probably normal
B none of the other offspring will be carrying this recessive allele
C the mother of these offspring was a carrier and so was the father
D none of the other mothers were carriers

34 Meiosis is different to mitosis because:

A mitosis can occur in diploid cells, whereas meiosis only occurs in haploid cells
B a phragmoplast forms at the end of mitosis, but not at the end of meiosis
C the four products of meiosis are non-identical, whereas the two daughter cells formed by mitosis are identical
D the drug colchicine has no impact on meiosis, but it brings mitosis to a halt

35 Temperature can have an effect on an enzyme reaction because:

A an increase in temperature gives a greater proportion of substrate molecules sufficient energy to pass the activation energy barrier for reaction
B heat allows enzymes to change their configuration to fit all substrate molecules
C heat decreases the entropy of a system
D heat changes the equilibrium constant of reactions

36 The final electron acceptor of the mitochondrial electron transport chain is:

A O_2
B CO_2
C NADH
D Acetyl-CoA

37 In which phase of meiosis does crossing-over occur?

A prophase I
B prophase II
C metaphase I
D metaphase II

38 In plants such as ferns, conifers, and flowering plants, mitosis takes place mostly in

A meristems.
B the centre of stems.
C the centre of roots.
D leaves.

39 Which of the following statements pertaining to sexual reproduction is true?

A The first cell of a sporophyte generation is normally a gamete.
B The change from a gametophyte generation to a sporophyte generation occurs immediately after meiosis.
C The offspring are nearly always identical with the parents.
D The first cell of a gametophyte generation is normally a spore.

40 DNA consist of 4 nucleic acids, these are

A Adenine, Uracil, Thymine and cytosine
B Guanine, uracil, thymine and cytosine
C Adenine, uracil, thymine and guanine
D Guanine, cytosine, adenine and thymine

41 Which of the following is the predicted genotypic ratio for progeny of a mating between a heterozygous (Pp) polled bull and a herd of horned cows. (Given that the allele for polled is dominant to the allele for horns is recessive in this species).

A 1 Pp : 1 pp
B 1 PP : 2 Pp : 1 pp
C 1 polled : 1 horned
D 3 polled : 1 horned

42 Colour blindness is a sex linked recessive trait. A man and a woman, each of whom has normal vision, have two children, one of whom is colour blind. It can be concluded that:

A daughters of this couple have a 0.5 chance of being colour blind
B if the couple have another child the chance that it will be colour blind is 0.5
C the colour blind child received the allele or colour blindness from its father
D the colour blind child must be male

43 The incidence of the deleterious recessive disorder mannosidosis in a cattle population is known to be 1%. Using Hardy Weinberg assumptions, calculate the proportion of sperm, carrying the defective allele in this population.

A 0.1 %
B 1.0 %
C 1.1 %
D 10.0 %

44 Several male mice with bent tails were mated to female mice with straight tails. All of the F1 males had straight tails and all of the F1 females had bent tails.

A this cross demonstrates that bent tails is the recessive phenotype
B the reciprocal of this cross would produce all straight tail offspring
C The female parent with a straight tail is heterozygous
D If the F1 bent tail females are backcrossed to the bent tail male, half of the male offspring would have bent tails and the other half of the males offspring would have straight tails

45 Non vascular plant phyla are:

A Mosses, liverworts and hornworts
B Mosses, club mosses, and angiosperms
C Liverworts, hornworts and fungi
D Algae, hornworts, lichens and horsetails

46 A male gametophyte from a magnoloiphyte is a

A Microspore
B Megaspore
C Anther
D Stigma

47 Which structure is not part of the cytoskeleton?

A Intermediate filament
B Microtubule
C Microphylls
D Microfilament

48 These cells have, on their surface, proteins which are capable of binding specific antigens:

A B cells
B T cells
C all lymphocytes
D all leukocytes

49 Sometimes it is possible to isolate blood serum from an animal that is immune to a disease and transfer that immunity to another animal by injecting it with the serum. In the recipient animal, this is referred to as

A passive immunity
B vaccination
C active immunity
D antibiotic therapy

50 Antigen specific lymphocytes are produced after presentation of the antigen by macrophages in the:

A pancreas
B bone marrow
C capillaries
D lymph nodes

51 Following meiosis, how many rounds of mitosis are needed to form the commonest type of male gametophyte in flowering plants?

A None.
B One.
C Two.
D Three.

52 An example of an anabolic reaction would be

A the conversion of glucose to pyruvate
B the conversion of pyruvate to lactate
C the conversion of PGAL (phophoglyceraldehyde) to glucose
D the conversion of PGAL (phosphoglyceraldehyde) to pyruvate

53 What role does oxygen play in cellular respiration?

A It plays no role.
B It is given off as a by-product during the oxidation of pyruvate.
C It combines with acetyl-CoA at the beginning of the Krebs (citric acid) cycle.
D It is the final electron acceptor in the electron transport chain.

54 The distinguishing features of the plant family Brassicaceae is:

A Flower parts in groups of three
B There are ray, ligulate and disc florets each with 5 petals and 5 stamens
C There are four petals and six stamens with 2 stamens being a different size to the other four.
D The petals are arranged in the standard, wings and keel and there are 10 stamens.

55 Carnivorous plants

A survive in conditions with very low levels of inorganic phosphorus.
B do not need roots as they get all their water and nutrients from insects.
C are common in nitrogen depleted soils.
D all of the above are correct.