MID OF TERM III EXAMS 2024

S.5 BIO P530/ 1

TIME: 2HRS 30 MINTUES

NAME…….SIGN……

INSTRUCTIONS TO SEMI-CANDIDATES

- ✓ Answer all questions in both sections **A** and **B**
- ✓ Write the letter to the correct answer in the corresponding box. Each question in this section carries one mark
- ✓ No additional sheets of paper should be inserted in this booklet.

SECTION A

1. A cell has 46 chromosomes at the beginning of meiosis, then at anaphase I there would be a total of

   A. 23 chromatids
   B. 23 chromosomes
   C. 46 chromosomes
   D. 92 chromosomes

2. Let A and a represent two alleles for one gene and B and b represent two alleles for a second gene. If for a particular individual, A and B were on one chromosome and a and b were on a second chromosome, then all of the following are true **EXCEPT**:

   A. The two genes are linked.
   B. The two chromosomes are homologous
   C. All gametes would be either AB or ab.
   D. The genotype of this individual is AaBb.
   E. An offspring of this individual could have the genotype AABB.

3. Four genes, J, K, L, and M, reside on the same chromosome. Given that the crossover frequency between K and J is 3, between K and L is 8 between J and M is 12, and between L and M is 7, what is the order of the genes on the chromosome?

   A. J K L M
   B. J K M L

C. K J L M
D. K J M L
E. K L J M

4. All of the following statements are true **EXCEPT**:
   A. Spindle fibers are composed largely of microtubules.
   B. Centrioles consist of nine triplets of microtubules arranged in a circle.
   C. All eukaryotic cells have centrioles.
   D. All eukaryotic cells have a spindle apparatus.
   E. Many of the microtubules in a spindle apparatus attach to kinetochores of chromosome

5. A property of water that makes it a suitable component of a hydrostatic skeleton is its
   A. High density
   B. High surface tension
   C. Low viscosity
   D. Incompressibility

6. In short day plants, flowering is induced by
   A. Auxins
   B. Abscisic Acid
   C. Gibberellins
   D. Ethene

7. Aquatic organisms survive under solidified water bodies because
   A. Water solidifies from bottom to top of lakes
   B. Ice is less dense than water a $4^{o}C$.
   C. Cold water is more dense than hot water and falls to the bottom
   D. Warm water floats on top of cold water.

8. The following would have a normal phenotype for are sex linked disorder? **Expect**
   A. Homozygote male
   B. Heterozygote Male
   C. Homozygote female
   D. Heterozygote Female

9. Large steroid molecules diffuse quickly through cell surface membranes suggesting that the membranes
   A. Consist of non-polar molecules
   B. Are semi-permeable
   C. Are freely permeable
   D. Are made of polysaccharides.

10. Lysosomes are

A. involved in the production of fats
B. involved in the production of proteins
C. involved in the production of polysaccharides
D. involved in the degradation of cellular substances

11. The two strands of a DNA molecule are connected by

A. hydrogen bonds between the codons and anticodons
B. hydrogen bonds between the bases of one strand and the bases of the second strand
C. hydrogen bonds between deoxyribose sugar molecules of one strand and deoxyribose molecules of the second strand
D. covalent bonds between phosphate groups

12. In fruit flies, dumpy wings are shorter and broader than normal wings. The allele for normal wings (D) is dominant to the allele for dumpy wings (d).Two normal-winged flies were mated and produced 300 normal-winged and 100 dumpy-winged flies. The parents were probably

A. DD and DD
B. DD and Dd
C. Dd and Dd
D. Dd and dd
E. dd and dd

13. Suppose that in sheep, a dominant allele (B) produces black hair and a recessive allele produces white hair. If you saw a black sheep, you would be able to identify

A. its phenotype for hair color
B. its genotype for hair color
C. the genotypes for only one of its parents
D. the genotypes for both of its parents
E. the phenotypes for both of its parents

14. Which of the following would most likely cause a mutation with the greatest deleterious effect?

A. An insertion of a nucleotide triplet into a DNA strand that codes for an mRNA
B. A deletion of a nucleotide triplet from a DNA strand that codes for an mRNA
C. A single substitution of a nucleotide in a DNA strand that, when transcribed, results in a change in the nucleotide occupying the third codon position in an mRNA

D. A single substitution of a nucleotide in a DNA strand that, when transcribed, results in a change in the nucleotide occupying the first codon position in an mRNA

E. A single addition of a nucleotide in a DNA strand that codes for an mRNA

15. Which of the following describes the turn-over number of an enzyme?
    A. Number of molecules affected by the enzyme
    B. Number of substrate molecules turned into its products per minute
    C. Number of product molecules formed.
    D. Number of substrate molecules catalyzed per minute.

16. The epithelial type lining the trachea walls is
    A. Columnar
    B. Cuboid
    C. Stratified
    D. Squamous

17. Which of the following is true?
    A. A messenger RNA molecule has the form of a double helix.
    B. Ribosomes contain RNA nucleotides and amino acids.
    C. The uracil nucleotide consists of the uracil nitrogen base, a deoxyribose sugar, and phosphate group.
    D. When tRNA attaches to mRNA during translation, cytosine nucleotides base-pair with guanine nucleotides, and adenine nucleotides base-pair with thymine nucleotides.

17. Which one of the following is not correct about cells of a tissue? They
    A. Have similar function
    B. Are of same origin
    C. Are of one type
    D. Have physical linkage

18. Which of the following generates the formation of adaptations?
    A. Genetic drift
    B. Mutations
    C. Gene flow
    D. Sexual reproduction
    E. Natural selection

19. .The B blood-type allele probably originated in Asia and subsequently spread to Europe and other regions of the world. This is an example of
    A. artificial selection

B. natural selection
C. genetic drift
D. gene flow
E. sexual reproduction

20. The appearance of a new mutation is
    A. a random event
    B. the result of natural selection
    C. the result of artificial selection
    D. the result of sexual reproduction

21. Which of the following is an example of sexual selection?
    A. Dark-colored peppered moths in London at the beginning of the industrial revolution
    B. The mane of a lion
    C. Insecticide resistance in insects
    D. Darwin's finches in the Galapagos Islands
    E. The ability of certain insects to avoid harm

22. A population consists of 9% white sheep and 91% black sheep. What is the frequency of the black-wool allele if the black-wool allele is dominant and the white-wool allele is recessive?
    A. 0.09
    B. 0.3
    C. 0.42
    D. 0.49
    E. 0.7

23. Which one of the following is correct about the extra cellular matrix of the cell? It is made-up of
    A. Polysaccharides only
    B. Phospholipids only
    C. Polysaccharides and glycoproteins e
    D. Phospholipids and glycoproteins

24. How is C4 photosynthesis different from C3 photosynthesis?
    A. C4 plants require more water for photosynthesis than do C3 plants.
    B. C4 plants can photosynthesize better in lower levels of light than can C3 plants.
    C. C4 plants are more efficient CO2 fixers than are C3 plants.

D. In C4 plants, chlorophyll P680 is more efficient than it is in C3 plants.

25. Which one of the following is likely to occur if a photosynthesizing plant was suddenly removed from light?
    A. Reduction in PGA
    B. Accumulation of PGAL
    C. Accumulation of PGA
    D. No change in amount of PGAL.

26. In poultry, feather colour is controlled by two sets of allele's W (white) dominant over w (coloured) and B (black) dominant over b (Brown). A fowl heterozygous for both alleles (WwBb) is white. This is an example of
    A. Gene complementarity
    B. Epistastis
    C. Pleiotrophy
    D. Incomplete dorminance

27. The unwinding of DNA double helix during transcription process requires the enzymes called
    A. DNA Ligase
    B. DNA polymerase
    C. Helicase
    D. Grana RNA polymarese

28. Compared to carbohydrates, fats have higher energy value because fats
    A. Have long chains of fatty acids
    B. Have a higher proportion of hydrogen
    C. Are more compact in structure
    D. Have a high proportion of oxygen

29. Which of the following structures is found in both xylem and phloem tissues of higher plants?
    A. Sieved tracheids.
    B. Parenchyma cells
    C. Companion cells
    D. Hollow vessels.

30. In what aspect are the photosynthesis adaptations of C4 plants and CAM plants similar
    A. In both the stomata close during day

B. In both, an enzyme other than RUBISCO carries out the first step in Carbon fixation
C. Both types of plants make most of their sugar in the dark
D. Neither C4 nor CAM plants have grana in their chloroplast

31. Which of the following have a sole function of offering support to the plant?
A. Sclerenchyma and vessel elements.
B. Vessel elements and tracheids.
C. Sclerenchyma and collenchymas.
D. Parenchyma and colenchyma.

32. If carbon-dioxide containing radio-active carbon was added to a suspension of photosynthesizing algae, in which one of the following compounds would the radio-active carbon show first?
A. Glucose
B. Phosphoglyceric acid
C. Ribulose biphosphate
D. Triose phosphate.

33. The minimum number of base substitution required to change a nucleotide sequenceofHbA (normal)alleles to Hbs (abnormal) alleles is
A. 1
B. 2
C. 3
D. 4

34. Which of the following animal tissue is most highly specialized?
A. Blood
B. Nervous
C. Epithelial
D. Bone

35. The internal solute concentration of a plant cells is about 0.8M. To demonstrate plasmolysis it would be necessary to suspend the cells in external solution with solute concentration of
A. 0.0 M B. O.4M C. O.8M D.1.0M

36. Which one of the following is correct about translation? One tRNA molecule
A. Pairs with one molecule of mRNA
B. Pairs with more than one codon
C. Codes with only one codon

D. Binds with more than one amino acid

37. The process of ripening in Unripe fruits is enhanced when they are enclosed with ripe ones because
A. IAA is produced by the ripe fruits to initiate ripening to others
B. Ripe fruits produce ethane, which facilitates ripening of the others.
C. Ripening fruits increase the temperature, which enhances ripening
D. The unripe fruits absorb moisture from ripe fruits which speed up ripening

38. Which one of the following processes would continue to take place in a living plant cell who's Golgi apparatus has been destroyed?
A. Formation of polypeptides
B. Autolysis of reluctant organelles
C. Formation of primary cell wall
D. Production of extra cellular enzymes

39. Which one of the following is the correct about a plant cell that has been immersed in pure water for several hours?
A. Osmotic potential equals to the water potential of the cell
B. Wall pressure is equal to the osmotic pressure plus turgor pressure
C. Wall pressue equals turgor pressure of the cell
D. Wall pressure becomes zero

40. Some amino acids are known as essential because they are
A. More important in the body metabolism than others
B. Not made by the body
C. Contained in first class proteins
D. Required in larger amounts than others.

SECTION B (60 MARKS)

41 a) Distinguish between photophosphorylation and photorespiration. (02marks)

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(b) State the differences between cyclic and non-cyclic photophosphorylation. (03 marks)

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c) i) Describe two evidences that show that oxygen produced during Photosynthesis is from splitting of water. (2marks)

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(ii) Why are C3 plants generally more abundant than C4 plants despite the photorespiration? (3marks)

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42 a) Describe three unique features of cells where active transport occurs. (3 marks)

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(b) Explain how endocytosis occurs across the plasma membrane. (3 marks)
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c) Discuss the various ways in which the plasma membrane permits Interactions with the outside environment (4 marks)
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43 Discuss each of the following as they lead to speciation. Use relevant examples

a) Adaptive radiation (3marks)
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b) Polyploidy (4marks)
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c) Sexual selection (3marks)

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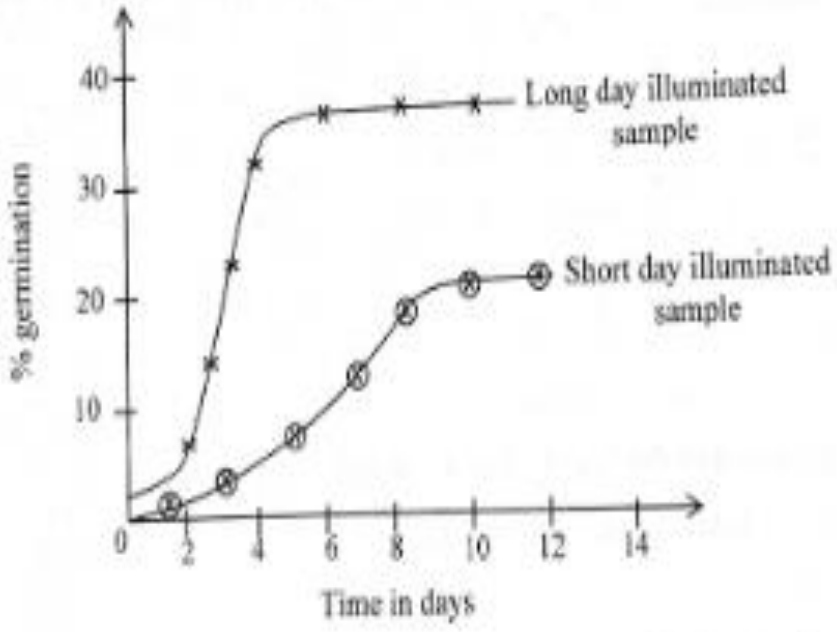
44. The figure below shows results of an experiment to demonstrate the effect of short day and long day illumination on the percentage germination of the seed sample from a short day plant

Fig. 3



a) State four differences in the effect of short and long day illumination on percentage germination of the seed samples (4 marks)

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b) Explain the effect of varying the illumination cycles onset on germination of the long day illuminated seed sample (3marks)

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c) State three other external factors that may influence the onset of germination of the above seed sample (3marks)

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45a) i) what is genetic variation? (1mark)
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ii) Identical twins share the same genotype. Explain the circumstances under which and aspects in which such twins may show some variation? (2marks)
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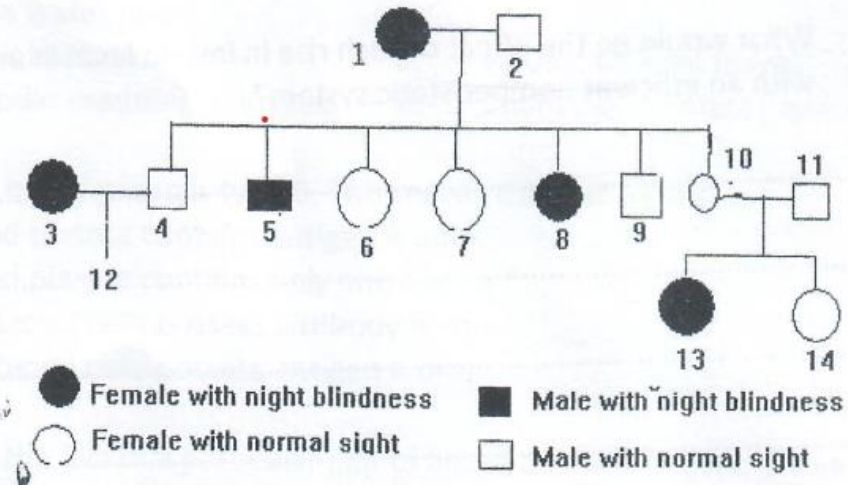
(b) Night blind - people have difficulty seeing in dim light. The allele for night blindness, **n**, is recessive to the allele for normal vision, **N**. These alleles are autosomal. The diagram shows part of a family tree showing inheritance of night blindness.



i) What evidence from the diagram above confirms that night blindness is not sex linked (1mark)

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ii) What is the most likely genotype of individual No.11? Support your answer with a reason
Genotype; (2marks)

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Reasons;

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iii) Workout the probability that the next child born by individual No. 10 and No. 11 is a girl with night blindness? (3marks)

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iv) Individual No. 12 is not a sufferer from night blindness. Across between individuals No. 12 and No. 14 would represent a marriage between first cousins. With evidence from the above diagram explain why a marriage between close relatives may be risky (2marks)

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46 Starch and cellulose have storage and structural functions in plants respectively.

(a) Explain how the molecular structure of starch and cellulose relate to these functional differences. (04 marks)

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(b) State how cellulose and starch differ in their building monomers. (03 marks)

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(c) Describe why water is an ideal medium for living things. (3mark)

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END

DO NOT GIVE UP

BIOLOGY P530/1
MARKING GUIDE SECTION A 2024
PAPER 1

1	**C**	**11**	**B**	**20**	**A**	**30**	**B**
2	**C**	**12**	**C**	**21**	**B**	**31**	**C**
3	**C**	**13**	**A**	**22**	**E**	**32**	**B**
4	**C**	**14**	**E**	**23**	**C**	**33**	**A**
5	**D**	**15**	**B**	**24**	**C**	**34**	**B**
6	**C**	**16**	**A**	**25**	**C**	**35**	**D**
7	**B**	**17**	**B**	**26**	**B**	**36**	**A**
8	**D**	**17**	**B**	**27**	**D**	**37**	**B**
9	**B**	**18**	**Free**	**28**	**A**	**38**	**A**
10	**D**	**19**	**D**	**29**	**B**	**39**	**A**

Racheal Nandego