Ahmedabad University

School of Arts and Sciences

BIO107 Concepts of Biology

End Term Examination 2024 (Winter Semester)

Total Marks = 60 **Time – 1 hour**

Student Name & Enrolment No:
Date: 27-04-2024
No. of printed pages: 9

1. Which of the following doesn't take place in prophase of mitotic cell?

A. Chromosome starts to condense
B. The nuclear membrane breaks down
C. The nucleolus disappears
D. The chromosomes pair up with their homologue

2. Mitosis occurs in _____

A. Nephron
B. Hair follicles
C. Neurons
D. Ovary

3. In which stage of mitosis do chromosomes lose their identity?

A. Prophase
B. Metaphase
C. Anaphase
D. Telophase

4. At which stage of the mitotic cell cycle is there the highest ratio of DNA to cytoplasm?

A. Beginning of G1 phase
B. End of telophase
C. Beginning of metaphase
D. End of G2 phase
E. Any point in G0
F. End of S phase

5. How many cells are produced as a result of mitosis in male, mitosis in female, meiosis in a male, meiosis in a female?

A. mitosis male – 2, mitosis female – 2, meiosis male – 4, meiosis female – 4
B. mitosis male – 2, mitosis female – 2, meiosis male – 1, meiosis female – 1

C. mitosis male – 2, mitosis female – 2, meiosis male – 4, meiosis female – 1
D. mitosis male – 2, mitosis female – 1, meiosis male – 4, meiosis female – 1

6. How does a somatic cell that has just completed the S phase of its cell cycle compare in respect to its number of chromosomes and amount of DNA with a gamete of the same species?

A. It has twice the number of chromosomes and twice the amount of DNA
B. It has the same number of chromosomes but twice the amount of DNA
C. It has twice the number of chromosomes and four times the amount of DNA.
D. It has four times the number of chromosomes and twice the amount of DNA

7. Late prophase of mitosis is sometimes known by the alternative term, _____.

8. How many hepatocytes would be produced by a series of four mitotic divisions that began with a single liver cell?

A. 4
B. 8
C. 16
D. 32

9. Consider the following four statements (I-IV) related to cell cycle:
I. Cell growth in terms of cytoplasmic increase is a continuous process
II. Interphase is the phase of actual cell division
III. The number of chromosomes doubles in S-phase
IV. The cell that does not divide further exits G1-phase to enter a metabolically inactive stage

Select the correct option stating them as true (T) or False (F)

	I	II	III	IV
A.	T	F	F	F
B.	F	T	T	T
C.	F	F	T	T
D.	T	F	F	T

10. Regarding meiosis, which statement is incorrect?

A. Four haploid cells form at the end of meiosis-II
B. In meiosis, there are two stages: meiosis I and II
C. DNA replication occurs in the S phase of meiosis-II
D. The pairing of homologous and recombination chromosomes occurs during meiosis-1

11. What results in the formation of chiasmata?

A. Exchange of parts of paired homologous chromosome
B. Exchange of part of unpaired non-homologous chromosome
C. Duplication of parts of paired homologous chromosome
D. Loss of parts of unpaired non-homologous chromosome

12. During mitosis ER and nucleolus begin to disappear at.

A. late prophase
B. early metaphase
C. late metaphase
D. early prophase

13. The reason for daughter cells to differ from parent cells and also each other in meiosis is;

A. Segregation and crossing over
B. Segregation and independent assortment
C. Segregation, crossing over and independent assortment
D. Independent assortment and crossing over

14. One of these events does not take place during meiosis

A. One successive division without any DNA replication
B. Chiasmata formation and crossing over
C. Segregation of homologous chromosomes
D. Separation of sister chromatids

15. Which of these statements is not true about fertilization?

A. The gametes are haploid
B. Gametes develop from diploid cells\
C. It involves the fusion of two gametes
D. Gametes have an incomplete set of chromosomes

16. Which of these undergo recombination?

A. Homologous chromatids
B. Non-homologous chromosomes
C. Non-sister chromatids
D. Sister chromatids

17. Aneuploidy is the condition associated with _____

A. transcription inefficiency
B. fragile chromosomes
C. abnormal chromosome number
D. inability to perform meiosis

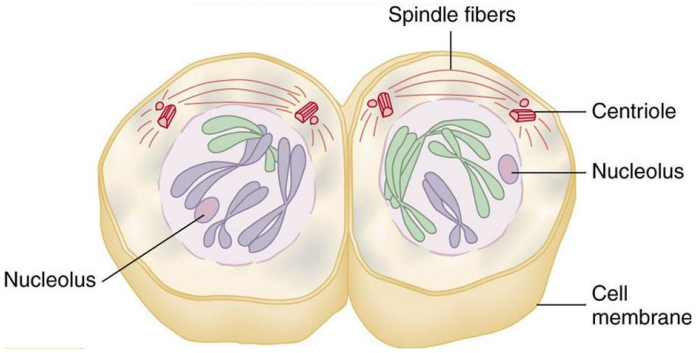
18. The absence of second X chromosome in a female lead to _____.

A. Down syndrome
B. Turner syndrome
C. Alzheimer's disease
D. Leukemia

19. Which of the following distinguishes prophase 1 of meiosis from prophase of mitosis?

A. homologous chromosomes pair up
B. spindle forms
C. nuclear membrane breaks down
D. chromosomes become visible

20. Identify the stage of meiosis depicted here:



21. _____ is a phenomenon where the expression of one gene is modified (e.g., masked, inhibited or suppressed) by the expression of one or more other genes.

22. What determines the differences between the progeny and parents?

A. Inheritance
B. Heritage
C. Genetics
D. Variation

23. The process of transfer of characters from parents to offspring is referred to as _____

A. Inheritance
B. Heritage
C. Genetics
D. Variation

24. If the blood group of both the parents is AB, then the possible blood group of their children will be:

A. A, B, AB, and O
B. A, B, and AB
C. A and B
D. A, B, and O

25. The alleles of a gene do not show any blending and both the characters are recovered as such in the F2 generation. This statement is:

A. Law of dominance
B. Law of segregation
C. Law of independent assortment
D. Law of natural selection

26. Which of the following genotypes and phenotypes in a man may be the correct result of aneuploidy in sex chromosomes?

A. 22 pairs + Y
B. 22 pairs + XY
C. 22 pairs + XXY
D. 22 pairs + XXXY

27. If you crossed two heterozygous plants, how many of the offspring will also be heterozygous?

A. all
B. half
C. 3/4
D. 1/4

28. This principle states that alleles separate during gamete formation:

A. principle of multiple alleles
B. principle of dominance and recessiveness
C. principle of independent assortment
D. principle of segregation

29. In each case where Mendel crossed true breeding plants as parents, the offspring displayed only one of the two traits seen in the parents. This observation supports which principle of genetics?

A. segregation
B. independent assortment
C. dominance and recessiveness
D. allele frequency

30. Down syndrome results from:

A. the absence of one chromosome in position 21
B. the presence of an extra chromosome in position 21
C. the absence of both chromosomes in position 21
D. crossing over on the chromosomes in position 21

31. An individual who has two of the same allele is said to be

A. homozygous
B. heteromologous
C. homologous
D. heterozygous

32. Which of the following properties about DNA replication is correct

A. Semiconservative mode of replication
B. Bidirectional replication
C. 5' ⟶ 3' replication
D. All of the above

33. The nicks, or gaps, between fragments on the lagging strand are eventually sealed by

A. DNA ligase.
B. RNA ligase.
C. Restriction endonucleases.
D. Gyrase

34. This statement concerning the nature of genetic code is inaccurate.

A. Universal
B. Overlapping
C. Codes for an amino acid
D. Triplet

35. This is not a necessary component in translation.

A. amino acid
B. ligase
C. mRNA
D. anticodon

36. Except for one, the following set of RNA is necessary in the translation process; indicate the INACCURATE?

A. Si RNA
B. rRNA
C. mRNA
D. tRNA

37. The process of formation of RNA is known as_____

A. Replication
B. DNA repair
C. Translation
D. Transcription

38. Like replication, transcription also occurs bidirectionally.

A. True
B. False

39. The enzyme required for transcription is

A. RNAase
B. DNA polymerase
C. RNA polymerase
D. Restriction enzymes

40. The main function of tRNA with regards to protein synthesis is

A. Proofreading
B. identifies amino acids and transports them to ribosomes
C. Inhibits protein synthesis
D. all of the above

41. One end of tRNA matches genetic code in three-nucleotide sequences known as

A. codon
B. genetic code
C. blunt ends
D. anticodon

42. The structure of DNA is closely related to its biological function. Which of the following statements regarding the structure of DNA is correct?

A. All base pairs interact by forming three hydrogen bonds.
B. DNA is comprised of nucleotide subunits each containing a base, a ribose sugar and a phosphate group.
C. The double helix of DNA is stabilized by interactions between adjacent ribose sugars.
D. Each DNA sequence folds into a unique and complex three-dimensional structure.

43. Create the complimentary strand for the DNA strand below. Make sure to label the parts and direction of the strand.

5'-AACGGTCCAGTCCAAGTTACG-3'

44. Mitochondria most likely evolved from _____.

A. a photosynthetic cyanobacterium
B. cytoskeletal elements
C. aerobic bacteria
D. membrane proliferation

45. _____ is an example of an antibiotic resistant strain

A. *E.coli*
B. *Clostridium botulinum*
C. *Salmonella typhi*
D. MRSA

46. A relationship between 2 organisms wherein both are benefitted from each other is:

A. parasitism
B. symbiosis
C. Commensalism
D. None of the above

47. Prokaryotes can be used for bioremediation for:

A. biotransformation of toxic elements into nontoxic forms
B. Cleaning up oil spills
C. To remove pollutants from drinking water
D. All of the above

48. The process of transfer of DNA from one bacterium to another through bacteriophages is called:

A. Transformation
B. Conjugation
C. Transduction
D. Binary fission

49. Which of the following is not a post transcriptional modification?

A. Dissociation of mRNA transcript from the DNA template.
B. Splicing
C. Addition of Poly A tail
D. Addition of a nucleotide cap

50. Gram-negative bacterium_____

A. describes a bacterium whose cell wall contains little peptidoglycan but has an outer membrane
B. describes a bacterium that contains mainly peptidoglycan in its cell walls
C. describes a bacterium with no peptidoglycan in its cell wall
D. describes a bacterium with only lipopolysaccharides in its cell wall

51. In the procedure of producing _____, the DNA from an adult human is introduced into a human egg cell, which is then stimulated to divide.

A. Recombinant DNA molecules
B. Embryonic stem cells
C. Genetically modified organisms
D. None of the above

52. What is the role of *Agrobacterium tumefaciens* in the production of transgenic plants?

A. Genes from *A. tumefaciens* are inserted into plant DNA to give the plant different traits.
B. Transgenic plants have been given resistance to the pest *A. tumefaciens*.
C. *A. tumefaciens* is used as a vector to move genes into plant cells.
D. Plant genes are incorporated into the genome of *Agrobacterium tumefaciens*.

53. State true or False: (5)

A. The current problem with using biomarkers for the early detection of cancer is the high rate of false-negative results.
B. PCR technique can be useful when a few copies of a DNA molecule are available for further analysis.

C. The difference in the rate of migration separates the DNA fragments on the basis of size.
D. Detergents are commonly used to disrupt the plasma membrane
E. Bacteria and archaea plasma membrane composition does not differ from each other.

54. Proteins that are produced from recombinant DNA molecules are called _____.

55. Prokaryotes are useful to us because:

A. They conduct metabolism of food molecules that we cannot break down,
B. They synthesize vitamin K,
C. They maintain the adult immune system
D. All of the above

56. A _____ is a disease that infects animals but can be transmitted from animals to humans.