BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI (RAJ.)
First Semester 2016-17
BIO F110 Biology Laboratory: Comprehensive Examination (Closed Book)

A

Maximum Marks: 80	**Time Duration: 60 min**	**Date: 30.11.2016**

Note:

1. **Answer the questions only in the answer sheet provided.**
2. **Write your answers in "CAPITAL LETTERS" only. No overwriting strictly.**
3. **Each MCQ is for 1M and each True/ False is for 0.5M.**
4. **There is 0.25M deduction for each wrong answer.**

Choose the most appropriate answer:

1. In animals, glucose is stored as _____.
   A) Starch B) Glycogen
   C) Cellulose D) Dextrin

2. A cancer patient, given an advanced chemotherapy, started to show signs of recovery. What change you expect to observe in the mitotic index of the cancerous tissue of this patient after new chemotherapy?
   A) There shall be no change in the mitotic index
   B) The mitotic index will increase
   C) The mitotic index will decrease
   D) Mitotic index for every cell is fixed and does not undergo any change in the life duration of an individual

3. If diameter/width of cuvette is doubled, Optical Density will get _____.
   A) doubled B) half
   C) remain same D) one fourth

4. Which of the following statement is correct in the context of observing DNA separated by agarose gel electrophoresis?
   A) DNA can be seen in UV light directly.
   B) DNA can be seen in visible light after staining with bromophenol blue.
   C) Ethidium bromide stained DNA can be seen in the visible light.
   D) Ethidium bromide stained DNA can be seen in the UV light.

5. What is the concentration of HCl used in Haemoglobin Estimation?
   A) 0.1N B) 1N
   C) 0.2N D) 0.5N

6. Which bond is present between Phytol tail and Porphyrin head in chlorophyll structure?
   A) Ether bond B) Anhydride bond
   C) Ester bond D) Hydrogen Bond

7. Absorbance of a solution containing light absorbing material doesn't depend on
   A) Diameter of the cuvette
   B) Nature of the substance
   C) Concentration of the solute particle
   D) Height of the cuvette

8. Ram and Shaam prepared slides for mitotically dividing onion root cells using colchicine treated cells kept in fixative. The slide prepared by Ram when viewed under high resolution microscope, showed some cells with a pink stained nucleus. Contrarily, the slide prepared by Shaam did not show any pink structures on the slide. If both the students stained the cells before preparing the mount for 5 minutes (as per the instructions), what could be the reason that Shaam's slide did not show any stained structures?
   A) Shaam missed treating the cells with 10% hydrochloric acid
   B) Shaam washed the cells in water for too long after staining
   C) The cells in Shaam's mount were impermeable to stain
   D) All of the above

9. In a DNA molecule, what kind of bonds hold one complementary strand to the other?
   A) Ionic B) Phosphodiester bond
   C) Hydrogen D) Van der Waals

10. The phytol tail helps in anchoring the chlorophyll molecules to thylakoid membrane due to the following property:
    A) Lipophilic nature
    B) Lipophobic nature
    C) Hydrophilic nature
    D) None of the above

11. Function of detergent in DNA isolation is to-
    A) Stabilize the structure of proteins in cells.
    B) Prevent denaturation of DNA.
    C) Solubilize and break down lipids in cells.
    D) Help in precipitation of DNA.

12. Glucose can have ____ isomers due to the presence of 4 asymmetric Carbon atoms
    A) 4 B) 12 C) 8 D) 16

13. Optical quantitation of glucose is done by-
    A) Reaction of cuprous oxide with iodine to give blue colour.
    B) Reaction of cupric oxide with phospho-molybdic acid to give blue colour.
    C) Reaction of cuprous oxide with phospho-molybdic acid to give blue colour.
    D) Both B and C.

14. Which of the following wavelength ranges is associated with UV spectroscopy?
    A) 0.8 - 500μm B) 100 - 400nm
    C) 400 - 750nm D) 0.01 - 10nm

15. Esophagus pushes the food along its short journey to the stomach by contraction of ____and by a mechanism known as____.
    A) tunica submucosa; peristalsis
    B) tunica muscularis; peristalsis
    C) tunica submucosa, deglutination
    D) tunica muscularis, deglunitation

16. Nucleic acid chains are formed by linkage of nucleotides through _____
    A) Dehydration B) Phosphorylation
    C) Hydration D) Hydrogenation

17. The clumping of RBCs during blood typing is known as
    A) Agglutination
    B) Aggregation
    C) Degradation
    D) Clotting

18. If you could override the control mechanisms that open stomata and force them to remain closed, what would you expect to happen to the plant:
    A) Sugar synthesis would likely slow down
    B) Water transport would likely slow down
    C) Both (a) and (b) could result by keeping stomata closed
    D) None of these would happen

19. The Lambert's law, which is a fundamental law of spectrophotometry states that-
    A) Transmittance is directly proportional to the path length.
    B) Transmittance is inversely proportional to the concentration
    C) Absorbance is directly proportional to the concentration.
    D) Absorbance is directly proportional to path length.

20. Which of the following statements regarding glucose is not true?
    A) Glucose is a monosaccharide sugar.
    B) Glucose can be metabolized by both aerobic and anaerobic metabolism.
    C) A high blood glucose concentration is called hypoglycaemia.
    D) D-glucose is found in blood but not in urine of normal individuals.

21. One of the methods to denature enzyme is boiling it for a given time. The denaturation of an enzyme by boiling causes:
    A) Unfolding of its secondary structure.
    B) Breakage of the hydrogen linkages forming alpha helix and beta sheets
    C) Disruption of the active site
    D) All of the above

22. In Lowry's method, biuret complex is formed between _____ and _____
    A) Cu^{2+} under neutral conditions; nitrogen in side residues of amino acids of peptide chain
    B) Cu^{2+} under alkaline conditions; carbon in peptide bonds
    C) Cu^{2+} under neutral conditions; carbon in peptide bond

D) Cu^{2+}under alkaline conditions; nitrogen in peptide bond

23. What is the composition of a nucleotide?
A) A hydrogenous base, a 3-carbon sugar, a phosphate group
B) A carbon base, a 5-carbon sugar, a phosphate group
C) A nitrogenous base, a 5-carbon sugar, a phosphate group
D) A nitrogenous base, a 3-carbon sugar, a phosphate group

24. A disease condition which results from the incompatibility of Rh factor is-
A) Erythroblastosis fetalis, occurs due to incompatibility of Rh negative father and Rh positive fetus.
B) Erythroblastosis fetalis, occurs due to incompatibility of Rh positive mother and Rh negative fetus.
C) Agglutination reaction due to blood group incompatibility.
D) Erythroblastosis fetalis, occurs due to incompatibility of Rh negative mother and Rh positive fetus.

25. The onion root tip was treated with colchicine to arrest mitosis. The number of chromosomes in a normal onion cell is 16 (2n). After colchicine treatment, the number of chromosomes observed in actively dividing root cells when observed under high resolution microscope should be_____ because_____.
A) 16; colchicine arrests mitosis and hence DNA replication.
B) 32; colchicine arrests mitosis but not DNA replication.
C) 16; colchicine inhibits spindle fibre formation and hence DNA replication.
D) 16; colchicine inhibits spindle fibre formation and hence centromere division.

26. Which parts of amino acids are involved in the formation of peptide bond framework?
A) The carboxyl group on one amino acid and the side chain of other
B) The amino group on one amino acid and the carboxyl group on the other
C) The carboxyl group on both the amino acids
D) None of the above

27. Chlorophyll b is an accessory pigment because:
A) It transfers absorbed energy to chlorophyll a
B) It is in lesser number than chlorophyll a in most of the plants.
C) It has CH_3 group instead of CHO group.
D) It is not found in blue green algae and red algae

28. Which of the following statements is true regarding AB blood group?
A) AB blood group is an universal recipient
B) AB blood group is an universal donor
C) AB blood group is an universal plasma donor
D) Both A & C

29. Which one of the following have perforated end walls and cytoplasm but no nucleus in phloem?
A) sclerenchyma cell B)tracheids
C) vessel elements D)sieve tube cells

30. Why is agarose used in DNA gel electrophoresis?
A) It is a solid matrix to sort DNA by size
B) It is a solid matrix to sort DNA by charge
C) It is a porous matrix to sort DNA by size
D) It is a porous matrix to sort DNA by charge

31. A student sets up a paper chromatogram and places a spot of green food dye on the origin. After six minutes the solvent has moved 12 cm and a blue spot has advanced 9 cm. After fourteen minutes the solvent has advanced a further 8 cm. How many cm from the origin is the blue spot likely to be?
A) 26.6 cm B) 15 cm
C) 18 cm D) 6 cm

32. If one of your parents has A blood group, while the other had AB blood group, the possible blood group of yours will be:
    A) Only AB
    B) A or B or AB
    C) B or A or O
    D) A or B or AB or O
33. Severe reactions are likely after transfusion of blood group:
    A) O to a group AB person.
    B) A to a group O person.
    C) A to a group AB person.
    D) Rh-negative to AB positive person.

34. Which stage of mitosis is not matched correctly?
    A) Prophase: nucleus disappears
    B) Metaphase: chromatids separate
    C) Anaphase: chromosome number double
    D) Telophase: cytokinesis

35. DNA has a net negative charge due to presence of:
    A) COO- group B) Phosphate group
    C) Amide group D) None of these

36. Plants dwelling in cooler climates have _____ number of stomata and _____ transpiration rate in comparison to plants growing in temperate climates.
    A) High; low
    B) Low; high
    C) High; high
    D) Low; low

37. Salt concentration is maintained in Paramecia by
    A) Buccal cavity B) Macronucleus
    C) Contractile vacuoles D) Cilia

38. Which of the following will cause the stomata to close?
    A) increase in carbon dioxide concentration
    B) darkness
    C) very high temperatures
    D) all of the above

39. Protein in an unknown sample can be measured colorimetrically by _____
    A) Biuret
    B) Bicinchoninic acid
    C) Commassie Brilliant blue
    D) All of the above

40. Cell wall of Bread mould is made up of _____
    A) Cellulose B) Lignin
    C) Protein D) Chitin

41. Aloe vera leaves have-
    A) More stomata on the upper adaxial surface.
    B) More stomata on the abaxial surface.
    C) Only few stomata are present.
    D) Equal distribution of stomata on both surfaces.

42. Which is correct for monocot stem?
    A) Vascular bundles are scattered
    B) Pith is present
    C) Endodermis present
    D) Secondary thickening occurs

43. Lowry assay is enhanced Biuret assay. Is this statement true or false? Choose the most appropriate from the following.
    A) False; Lowry assay does not involve biuret formation
    B) False; Biuret is complex formed between urea molecules
    C) True; Lowry assay involves biuret formation between the free amino acids and metal ions along with interaction with Folin's reagent
    D) True; The blue coloured complex formed as the end product is an outcome of electrons released during biuret complex formation between peptide and metal ion as well as reduction of Folin's reagent.

44. Considering the fact that the stomata opens when guard cells are turgid and stomata closes when guard cells are flaccid. In which of the following structure and conditions, the student will observe the stomatal pore to be open when observed under microscope
    A) Aloe vera leaf epidermal layer in hypertonic solution
    B) Aloe vera leaf epidermal layer in hypotonic solution

C) Aloe vera root epidermal layer in hypertonic solution
D) Aloe vera root epidermal layer in hypotonic solution

45. Chlorophyll is a :
A) Photoreceptor
B) Chemoreceptor
C) Thermoreceptor
D) Both A and C

46. The role of alkaline copper reagent in Lowry's method is:
A) Reduction of cupric ions to cuprous ions
B) Oxidation of copper ions to cupric form
C) Reduction of phosphomolybdate tungstate to heteropolymolybdenum blue
D) None of the above

47. If a shipwrecked crew drinks sea water, they will probably die. Why?
A) Due to deplasmolysis, cells of his body will shrink.
B) Due to plasmolysis, cells of his body will shrink.
C) Swelling of body due to excessive water absorption.
D) Dehydration of body due to loss of water.

48. The antigen and antibody present in a person with blood group B- is:
A) Ag B ; Anti A;
B) Ag B ; Anti A; Anti Rh factor
C) Ag A ; Anti B;
D) Ag A ; Anti B; Anti Rh factor

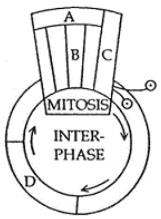
49. Marine fish when thrown under tap water bursts because of:
A) Endosmosis B)Exosmosis
C) Diffusion D) Plasmolysis.

50. Which of the following is correct for the function of oxygen for detecting glucose on the diastix strip in the Lactase experiment you performed
A) Presence of oxygen inhibits the reaction
B) Presence of oxygen slows down the rate of reaction
C) Presence of oxygen is necessary for the oxidation
D) Presence of oxygen has no effect on the detection.

51. On a rainy day, the rate of transpiration would be:
A) High, as humidity is less
B) Low, as humidity is more
C) No effect on rate of transpiration
D) Would be unaffected by climate

52. A research group in an attempt to device a medium for optimal cell division of plant cells (protoplasts) in laboratory conditions tested 4 growth media viz. A, B, C and D. The mitotic index of the cells when supplemented with each of these media were 0.25, 0.80, 0.50 and 0.10 for A, B, C and D, respectively. Which is the best media that should be used for the plant cells in this study?
A) A B) B C) C D) D

53. Given below is a schematic break-up of the phases/stages of cell cycle. Which one of the following is the correct indication of the stage/phase in the cell cycle?
A. Cytokinesis
B. Metaphase
C. Karyokinesis
D. S phase



54. Water enters the root hair from the soil by the process of_____. This is because the solution in the soil is_____whereas the call sap in the root hair cell is _____. The water then passes through the cortical cells by cell to cell and reaches the xylem for distribution in plant.
A) Endosmosis, hypertonic, hypotonic
B) Exosmosis, hypertonic; hypotonic
C) Endosmosis, hypotonic; hypertonic
D) Exosmosis, hypotonic; hypertonic

55. The experiment conducted in the class using Ganong's Potometer, informs about
A) Exact rate of transpiration under the given environmental conditions
B) Rate of water uptake

C) Rate of water utilized in metabolic activities of plant
D) both B and C

56. Which of the following statement is correct about enzymes?
A) Enzymes does not alter the activation energy for a reaction
B) When an enzyme catalyzes a chemical reaction, some of the enzyme is lost
C) All enzymes can function on their own
D) Binding of substrate induces a conformational change in the enzyme

57. The retention factor of a molecule depends upon: i) Movement of solvent ii) Solubility of molecule in solvent iii) Affinity of molecule to the stationary phase
A) Both i and iii B) Both i and ii
C) Both ii and iii D) All of the above

58. If a 5M NaCl solution (S1) is separated from a 10M NaCl solution (S2) by a semipermeable membrane, then
A) Solvent moves from S1 to S2
B) Solvent moves from S2 to S1
C) Solute moves from S2 to S1
D) Solute moves from S1 to S2

59. The unit of hemoglobin value in Sahil's (Sahli's) method is _____.
A) gm/100ml B) gm/ml
C) mg/ml D) None of the above

60. Guard cells differ from subsidiary cells in having
A) chloroplast B) cell wall
C) stomata D)All of these

61. The enzyme substrate activity is not affected by:
A) Temperature
B) pH
C) conformation of product
D) None of the above

62. Which of the difference between Chlorophyll a and chlorophyll b is incorrect
A) Chlorophyll a has a methyl group (-CH3) while chlorophyll b has an aldehyde group (-CHO).
B) Chlorophyll a is blue green while chlorophyll b is yellow green.
C) Chlorophyll a is soluble in methyl alcohol while chlorophyll b is best soluble in petroleum.
D) All the statements are correct.

63. The enzyme in the Lactase milk experiment was denatured by:
A) Adding 1 molar NaOH
B) Adding 4 molar HCl
C) Boiling it for 30 mins
D) Adding 2 molar NaOH and chilling it at -20^{o}C

64. Lactase enzyme acts upon the _____ bond of lactose

A) Phosphodiester bond
B) β- Glycosidic bond
C) Amide bond
D) None of the above

65. The filter used for the Lowry's method for protein experiment is
A) Red Filter
B) Green filter
C) Blue filter
D) Both a and c

66. The _____in the duodenum are responsible for efficient nutrition absorption.
A) Villi
B) Brunner's glands
C) cilia
D) No absorption occurs in duodenum

67. During prophase, the centrioles:
A) Join together
B) Move to center of cell and form 2 separate poles
C) Move to opposite ends of cell and form 2 separate poles
D) None of the above

68. The Farmer's fixative used in preparation of mitosis slide (ethanol and acetic acid in ratio 3:1), leads to____ so that the various mitotic stages can be observed clearly.
A) making the cell wall and cell membrane porous

B) Arrest the metabolic state of the cell.
C) Prevention of deformation of cell structures.
D) Both B and C

69. Which of the following factors is most important in the movement of water up a tall tree?
A) Air pressure
B) Leaf transpiration
C) Active transport in the xylem
D) Gas exchange.

70. Photosynthesis does not take place if a plant is exposed to light of color
A) Blue B) Red
C) Green D) White

71. The number of vascular bundles in dicot stem are
A) numerous
B) 17 -20
C) 4 – 8
D) 50 – 100

72. Turgor pressure is always equal and opposite to
A) Osmotic pressure
B) Wall pressure
C) Osmotic potential
D) Water potential

73. The combination of amino acids take part in reaction with Folin's reagent and give blue colour intensity in protein estimation?
A) Polar and non-polar amino acid
B) Non-polar and aromatic amino acid
C) Polar and aromatic amino acid
D) only aromatic amino acids

74. The structure that connects groups of fungal hyphae to each other is known as :
A) Rhizoids
B) Stolon
C) Sporangiophore
D) Mycelium

State True/ False (Write complete word)

1. Diastix test strips are commonly used to check the protein level in urine sample of a diabetic patient.
2. If the enzyme concentration of lactase is taken 5 times than that of your experiment, the diastix strip would show positive results with sucrose too.
3. Breaking down of lactose to glucose and galactose is a reversible reaction if the conditions are made endothermic.
4. Sucrose, if broken into its monomeric components can be detected by the diastix strips.
5. Plasmolysis is a reversible phenomenon.
6. In our experiment, we used onion root tip to study plasmolysis
7. Flaccidity of cells lead to wilting of the plant leaves.
8. Through plasmalysis we can find the rate of solute transfer inside or outside the cell membrane.
9. In Lowry's method, Phosphomolybdate is reduced by Folins Cioclateau reagent.
10. The concentration of hexokinase can be estimated using Lowry's method.
11. While measuring absorbance of a solution, path length and wavelength are kept constant.
12. Only aromatic amino acids can be detected by Lowry's method.