ANEKANT EDUCATION SOCIETY'S

TULJARAM CHATURCHAND COLLEGE OF ARTS, SCIENCE AND COMMERCE

AUTONOMOUS INSTITUTE

QUSTION BANK

Class: M.Sc. (Semester – I)

Paper Code: ZOO:4102

Paper: III – Cell Biology **Credit: 2**

Contributed by: Dr. Maheshkumar D. Kharat

DEFINE AND SHORT ANSWER QUESTIONS:

1) What is endocytosis?
2) Define nucleoid.
3) What are membrane receptors?
4) Give functions of Micro tubules?
5) Define necrosis.
6) F1 particles.
7) What is unit membrane?
8) Mention effects of free radicals on cell.
9) Give significance of crossing over.
10) What are carcinogens?
11) Define cell.
12) What is pinocytosis?
13) What are suicide bags?
14) State biochemical composition of microtubules.
15) What is heterophagy?
16) What is G1 phase.
17) Sate polymorphism in Lysosomes..
18) Give two functions of Golgi complex.

19) Define somatic mutation.

20) What is synapsis?

21) What is phagocytosis?

22) Give names of any two models of plasma membrane.

23) What are intermediate filaments?

24) What is autophagy?

25) Define oncogene.

26) Give names of two types of lysosomes.

27) Write two functions of Endoplasmic reticulum.

28) What is MOTC's ?

29) Define microtubules.

30) Give the four characters of cancer cells.

31) What is metastasis ?

32) Write five biological cancer causing agents.

33) Write five physical cancer causing agents.

34) Write five chemiical cancer causing agents.

35) Write three names of tumor viruses.

36) State p53 role in cell cycle regulation.

37) State the inhibitors of cytoskeleton.

38) Give the role of secondary messengers.

39) Give the two check points of cell cycle.

40) What is protein polarity?

41) Give the four biological importance of carbon.

42) State the role of cell division.

43) Write two functions of peroxisomes.

44) Write two functions of glyoxysomes.

45) Write a role of endoplasmic reticulum in endomembran system.

46) Write a role of protein folding in endomembran system.

47) Write a role of lipids in endomembrane system.

48) Define Fluid Mosaic model.

49) What is the function of macromolecules in living system.

50) State the role of water in living system.

SHORT NOTES AND SHORT ANSWER QUESTIONS:

1) Somatic mutation.
2) Intra and extra cellular changes during cellular ageing.
3) Significance of meiosis.
4) Active transport
5) Apoptosis
6) Intrinsic causes of cancer.
7) Metastasis
8) G-Protein
9) Cell signaling
10) Golgi complex
11) Lysosome
12) Endoplasmic reticulum
13) Mitochondria and chloroplast
14) Glyoxysomes and peroxisomes
15) Synaptic transmission
16) Membrane potential
17) Extra and Intracellular matrix
18) Kinases dependent cell cycle
19) Membrane receptors
20) p53
21) Cell-Cell junction
22) Adhesion junction
23) Hormonal signaling
24) Genetic system of mitochondria
25) Types of cancer
26) Adeno virus
27) SV40
28) Polyoma virus
29) Oncogenes
30) Papilloma virus
31) Gap junctions
32) Claudins
33) Protein trafficking
34) Active and passive transport
35) Microfilaments
36) Myosin
37) Mitosis
38) Mitochondrial inheritance

LONG ANSWER QUESTIONS:

1) Describe the ultrastructure and interrelationship of the Lysosome and Golgi complex and comment on their functions..
2) Define cell cycle. Describe various phages of cell cycle. Add a note on significance of mitotic cell division.
3) Describe mitotic cell division. Add a note on the role of centriole in the cell division.
4) Describe ultrastructure types and functions of Endoplasmic reticulam,
5) Describe how a soluble protein crosses the ER membrane and enters the lumen.
6) Motor proteins that move along the cytoplasmic microtubules belong to two different families. Name and describe both families. Be sure to include the direction in which each family moves and the process in which they move along the microtubules.
7) Scientists say they have discovered a protein called directin, which is a first of its kind. Directin is a necessary nuclear protein that mysteriously is translated directly into the nucleus. It seems as though large amounts of directin in the cytoplasm can interfere with endocytosis, but that doesn't matter specifically because of its rare method of translation. Discuss two negative effects that directin would have once the cell undergoes mitosis
8) As a researcher you found a new protein in a yeast cell that you believe is responsible for transporting materials out of the ER and into the Golgi Apparatus. A mutant gene for the protein causes the protein to cease function at certain temperatures. Using this information design a way to test your theory. Feel free to draw a diagram to accompany the answer.
9) Explain the role of the Endoplasmic Reticulum in protein folding. Consider quality control, the solutions to folding and refolding, and the degradation of proteins.
10) A patient comes into your clinic with unexplained paralysis in her limbs. She has no history of neuromuscular problems. After further questioning you find that she had taken a drug "X." Explain the effect of a possible toxin in the drug on actin filaments that might be the cause of her paralysis.
11) Describe in detail how the three essential processes for cell crawling occur.
12) The budding and fusion of vesicles are unfavorable processes. List four proteins that are either involved in the vesicle budding or fusion and describe the process.
13) Track the formation, transport and deposition of a clatherin coated transport vesicle from the ER to the golgi apparatus, but not through it.
14) Jello is structured in the same way that the cytoskeleton of a cell is arranged. Pineapple contains excess protease enzymes, that when placed in the jello, disable the

cross-links which enable the jello to hold its form. Using this information and your knowledge of the cellular filaments, explain the mechanism by which the pineapple breaks down the jello and if the addition of a similar enzyme in a cell could lead to the degradation of the cytoskeleton. Be sure to explain your answer.

15) How does the structure of intermediate filaments create strength for the cell?

16) Protein Disulfide Isomerase in the ER aids the incoming translated proteins to fold correctly. Explain how the enzyme does this, and why, in terms of □G and Kb, the isomerase does not interfere with its configuration once it has folded properly.

17) Describe at least 2 mechanisms by which proteins are imported into cell organelles.

18) List the components of the cytoskeleton and briefly discuss their properties.

19) Briefly describe the two models of the Golgi apparatus, and provide two supporting facts for each model.

20) Briefly explain the difference between membrane-bound and free ribosomes.

21) Explain the organization of the structure of an intermediate filament. How does the structure help the protein with its function?

22) A scientist doing research on *Frankenstein (who is still made of all human parts) discovers that during his electrifying reincarnation, a gene encoding tubulin is mutated. The result is the formation of alpha-beta-alpha trimers. In this monster* there are also normal alpha beta dimers of tubulin produced but both the mutated and normal tubulin are produced such that there are trimers and dimers of tubulin in each cell. Assuming it was a stable trimer and they all lined up in the same row so as to maintain the tube-like structure, how would its integration into a microtubule affect microtubule extension for the plus end? the minus end?

23) Two kinds of proteins are transferred from the cytosol to the ER; water-soluble proteins and prospective transmembrane proteins. Water-soluble proteins are completely translocated across the ER membrane whereas transmembrane proteins are only partly translocated. Explain the differences in the mechanism by which these proteins are translocated.

24) The drug *colchicine* is used to stop the activity of organelle movement by acting on the microtubules in the cell. Provide a general mechanism for the action of *colchicine* on the microtubules that would result in the movement of organelles being significantly slow or even halted.

25) List the steps by which myosin molecules walk along actin filaments through a cycle of structural changes? (Hint: There are five) Also, briefly describe what happens during each step.

26) You isolate two cells' mitochondria. Through FRAP technique, you determine that the membranes differ in fluidity. Cell A's membrane is more fluid, while B's is less fluid. Discuss which mitochondria will be better able to import proteins, and why.

27) You are able to completely sequence a yeast gene, and find that all its SNAREs are involved in backward transport recognition. Which model of protein transport does this support, vesicular transport or cisternal maturation? Why?

28) Describe how a soluble protein crosses the ER membrane and enters the lumen.

29) Name two similarities and two differences between the cellular processes of importing protein into the ER and importing protein to the nucleus.

30) Suppose a cell was treated with colchiine, a drug causing microtubule disassembly. What would happen within the cell? Why?

MULTIPLE CHOICE / TRUE-FALSE QUESTIONS:

1) What proteins are directly involved in the transportation of cargo in a clathrin-coated vesicle?

    a) Dynamin
    b) Adaptins
    c) Cargo receptors
    d) t SNARES

2) Which of the following are true about microtubules?

    a) They are utilized by the disease causing bacteria Lysteria.
    b) Instability in the minus-end of the microtubule is caused by the hydrolization of GTP.
    c) Centrosomes contain binding sites for microtubules composed a type of tubulin ring.
    d) Cellular concentrations of tubulin are above the critical concentration for plus-end polymerization.
    e) Motor proteins can attach organelles to the microtubules.

3) Indicate which of the following statements are false:

    a) Membrane fusion is energetically unfavorable and thus requires ATP or similar high energy molecule to occur.
    b) Clathrin is responsible for capturing specific molecules for transport in coated vesicle structures.

c) Receptor proteins that are incorporated into an endosome can be retrieved back to the membrane domain it originated from; can return to a new domain of the membrane; or can enter the lysosome for digestion.
d) Transport vesicles occasionally bud from the *trans* Golgi network to fuse with the plasma membrane in a process called constitutive exocytosis.
e) Most components of the endocytic vesicle membrane eventually are returned to the plasma membrane for reuse.

4) Match the following organelles with their function:

A. Organelle Bank:

a) Mitochondria
b) Endoplasmic reticulum
c) Nucleus
d) Lysosome
e) Endosome
f) Peroxisome
g) Golgi apparatus

_____ quality control of mRNA
_____ location of oxidative phosphorylation
_____ responsible for detoxifying organic molecules (liver cells)
_____ houses and protects genetic material
_____ responsible for modification and sorting of proteins and lipids
_____ location of ATP synthesis
_____ responsible for sorting endocytosed materials
_____ site of degradation and digestion
_____ responsible for oxidizing toxic molecules
_____ location of lipid synthesis
_____ location of hormone synthesis (adrenal cells)

B. Which organelle(s) from the above list communicate(s) with other organelle(s) through the use of vesicular transport? _____

C. Which organelle(s) from the above list receive proteins made in the cytosol? _____

D. Through which organelle(s) must proteins pass to reach the organelle(s) which do not receive proteins made exclusively in the cytosol?_____

E. Entrance into which organelle(s) requires that proteins unfold and snake through the membrane? _____

F. How do organelles maintain their position in the cytosol? Be specific.

G. Give 2 advantages that eukaryotic cells gain by having organelles.

5) Which of the following statements are true regarding actin?
   a) They are arranged in a "9 + 2" arrangement.
   b) They form microvilli.
   c) Each filament has a structural polarity.
   d) Actin monomers are tightly bound to GTP, which is hydrolyzed once the monomer becomes incorporated into the filament.
   e) Tropomyosin can bind to actin and stabilize the filament.

6) Which of the following do transport vesicles deliver to the cell surface?

   a) Proteins
   b) Lipids
   c) Dynamin
   d) Adaptions

7) Which of the following is NOT true about intermediate filaments?

   a) Cytoplasmic intermediate filaments form sheet-like structures.
   b) Nuclear intermediate filaments form a two-dimensional mesh structure.
   c) Intermediate filaments consist of protein subunits that have N-terminal globular tails.
   d) C-terminal globular heads.
   e) Intermediate filaments of the nuclear lamina disassemble and reform each cell division.

8) When colchicine is added to a cell, the following will occur:

   a) Microtubules will grow at a faster rate.
   b) Microtubules will shrink at a faster rate.
   c) Movement of membrane-enclosed organelles will be impaired.
   d) More free tubulin will be available in the cell.
   e) Free tubulin in the cell will be unchanged.

9) You are examining the effects of mutations on a nuclear pore. In which of the following cases will nuclear proteins still be able to enter the (include those where function will be impaired, but still able to occur):

   a) The nuclear localization signal is mutated on a nuclear protein.

b) The nuclear transport receptor cannot bind to the nuclear protein.
c) A limited amount of kinase is available in the cell to hydrolyze the GTP.
d) Nuclear transport proteins pass through with nuclear proteins but cannot be recycled to the cytosolic side of the cell.
e) The nuclear protein is unable to unfold.

10) The varied forms and functions of actin filaments in cells depend on multiple actin binding proteins. These are involved in:

a) Polymerization of actin filaments.
b) Cross-linking the filaments into loose networks.
c) Making stiff bundles of actin and attaching them to membranes.
d) Moving actin filaments relative to one another.

11) Which of the following occur in the ER lumen?

a) Proteins fold.
b) Proteins assemble with other proteins.
c) Proteins form disulfide bonds.
d) Proteins become "decorated" with oligosaccharide chains.

12) Which of the following would be false for the Cisternal Maturation model of the Golgi apparatus?

a) Vesicles are involved in the transport of proteins.
b) Enzymes are transported by vesicles.
c) Tubules transfer enzymes from one cisterna to the next cisterna.
d) Cisterna evolve from the ER.
e) Vesicles evolve from the trans-cisterna and fuse with the plasma membrane.

13) Which of the following proteins bind to actin filaments during its involvement in the movement of a cell?

a) ARP Complexes.
b) Plectin.
c) Scruin.
d) Depolymerizing protein.
e) Capping protein.

14) The Golgi apparatus performs which of the following functions?

a) Sorting.
b) Oxidative phosphorylation.

c) Intracellular degradation
d) Modification of proteins
e) Packaging of lipids

15) You come across two molecules of unknown size in a cell. You tag both with GFP, and put them into two ghost cells, both containing a nucleus and nuclear pores. After waiting 30 mins., you observe the activity in the cells. In the first cell, you notice less of the tagged molecule A in the cytosol, but in the second cell the same amount of molecule B is observed.

a) Design an experiment to test your hypothesis that molecule A diffused freely through nuclear pores in the nuclear membrane.
b) List 3 different possible types of molecules that could be molecule A.
c) What would you be able to do to molecule B to allow it to move through nuclear pores?

16) Mutations in the protein plectin, the cross-linking accessory protein in the intermediate filaments, can cause the human diseases:

a) Epidermolysis bullosa simplex
b) Lysteria
c) Muscular dystrophy
d) Neurodegeneration
e) Parkinson's disease

17) Which of the following contributes to the greater Kb of the plus end of the microtubules over the minus end?

a) Kinesin acts as a stabilizing force of the + end.
b) ATP binding changes the conformation.
c) Capping proteins bind and stabilize the + end.
d) Side-binding proteins associate and stabilize the interactions and the alpha subunit.

18) Which of the following are actin-binding proteins:

a) Bundling proteins
b) Ras-activating proteins
c) Nucleating proteins
d) Side binding proteins
e) G-Proteins

19) Which of the following participate in the formation of a vesicle?

a) Dynamin
b) SNARES
c) Clathrin
d) Adaptin
e) cAMP kinase

20) Which of the following directly participate in muscle movement?

a) Myosin
b) Sarcomeres
c) Dynamin
d) Tropomyosin
e) Clathrin

21) Which of the following are essential in the formation of a clatherin coated transport vesicle?

a) Clathrin
b) Adaptin
c) COP I
d) PDI
e) Snares

22) Which of the following are specific to intermediate filament lamins?

a) Maintain the nuclear envelope.
b) Structure is more linear than intertwined.
c) Completely disassemble and reassemble with each cell division.
d) Are non-dynamic structures.
e) Play a role in cell signaling.

23) Which of the following functions does the SRP do?
a. binding to the ribosome.
b. bringing the ribosome to the SRP receptor.
c. stopping translocation.
d. bringing the growing protein to the translocation channel.
e. cleaving the N-terminal signal sequence.

24) Microtubule functions include

a) Movement of organelles
b) Cell division
c) Mobility of the cell
d) Attachment of proteins to carbohydrates
e) Organization of the Plasma Membrane

25) An internal ER signal sequence emerges, reluctantly, but alertly, from a ribosome in the cytosol. This sequence has a region of positive charges on the COOH end. The protein ends its translation life cycle:

a) With the NH2 end located internally (non-cytosolic).
b) With the NH2 end located externally (cytosolic).
c) With the COOH located internally.
d) With the COOH located externally.

26) An enzyme is added to a cell that degrades the snares in all the membranes. A vesicle leaving the ER will

a) Recognize but not fuse with the target membrane.
b) Fuse with the first membrane with which it comes in contact.
c) Not recognize nor fuse with any membrane.
d) Not occur because the vesicle will not be able to form.

27) Which of the following is involved in snare docking?

a) ATP
b) A pulling attraction between the two membranes
c) Dynamin
d) GTP

28) Which of the following is not involved with intermediate filaments?

a) Basal bodies
b) Addition to the plus end, subtraction from the minus end
c) Dynein and kinesin
d) Conserved and variable regions

29) Pertaining to the growth and shrinkage of microtubules, which of the following statements is/are NOT true?

a) In a microtubule tubulin dimer carrying GTP are bound more tightly to one another than polymerized tubulin dimers carrying GDP.
b) Microtubules with tubulin dimers containing GTP tend to stop growing.
c) The hydrolysis of GTP to GDP on the tubulin dimers stabilizes the microtubule.

d) The tubulin at the free end of the microtubule occasionally hydrolyzes its GTP to GDP before the next tubulin dimer can be added due to the randomness of the chemical process.
e) At any one time, the amount of tubulin dimers is found more often in polymerized microtubules than as individual dimers within the cell.

30) Free ribosomes are different from ER bound ribosomes in which of the following way(s)?

a) Only ER bound ribosomes can bind SRP.
b) They differ in the proteins they are making at that given time.
c) Multiple free ribosomes can be bound to the same mRNA, which is not the case for ER bound ribosomes.
d) Free ribosomes only make proteins destined for the nucleus.

31) The ER signal sequence is guided to the ER membrane with the aid of a

a) Signal-recognition particle (SRP)
b) Translocation channel
c) SRP receptor
d) Membrane bound ribosome

32) Which of the following are true concerning actin filaments and their function?

a) Dyenin causes actin bending and sliding.
b) Actin monomers have intrinsic ATPase activity.
c) Elongation is bidirectional, however, unlike microtubules, actin filaments lack polarity and polymerization occur at the same rate on both ends.
d) Cell movement involves the formation of a lamellipodium by the polymerization of actins at the positive end.
e) Contraction of the actin-rich cell cortex is caused by myosin I during cell movement.

33) What membrane-enclosed organelles are thought to have arisen by invagination of the plasma membrane and are part of the Endomembrane System?

a) Endosomes
b) The Golgi Apparatus
c) Mitochondria
d) The Endoplasmic Reticulum
e) Chloroplasts

34) Which of the following changes takes place when dynein binds to an actin filament?

a) It causes microtubule bending.
b) It generally moves toward the plus end of a microtubule.
c) It uses ATP hydrolysis to travel steadily along the actin filament.
d) It causes a conformational change of the actin filament.
e) It moves toward the minus end of the microtubule.

35) A protein has a nuclear localization sequence that never encounters the cytosol. Which of the following is true about the protein?

a) It will not enter the nucleus.
b) It contains a nuclear localization sequence at the middle and an ER Sequence at its Nterminus.
c) It will be secreted by a process called exocytosis.
d) Reduction of the protein will allow for stabilization.
e) Glycosylation will occur if it has a single sugar residue attached

36) Which of the following is true about microtubules?

a) Selective stabilization can lead to their depolarization.
b) Anchor membrane-enclosed organelles and for guide intracellular transport.
c) Consist of hollow tubes with structurally indistinct ends.
d) Centrioles are necessary for nucleation of microtubules.
e) Transport cargo along a nerve cell axon.

37) Kinesin and Dynein both move in similar ways along the length of a microtubule.

a) Explain the mechanism of the movement of Kinesin and include the structure of Kinesin.
b) Explain the mechanisms of the bending of microtubules in a flagella. Include the roles of dynein and its significance.

38) Choose the correct statements about exocytotic pathways below:

a) Adaptins can bind to both the cargo receptors of the ER and of the Golgi.
b) Coated vesicles help shape the membrane into a bud (vesicle).
c) Small GTP binding proteins called dynamin secure the clathrin coat to the vesicle membrane.
d) t-SNARES are recognized by complementary v-SNARES located on the target membrane.
e) COP coated vesicles transport molecules between the Golgi and the ER as well as within the Golgi itself

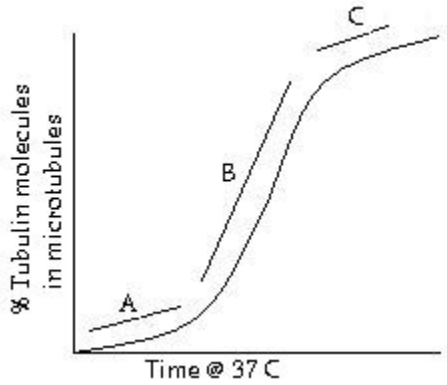
39) Unlike nuclear membrane protein translocation, the ER membrane is unable to import folded proteins. To solve this problem the proteins are translated and translocated simultaneously across the membrane.
    a) What two problems does this present in terms of protein folding?
    b) How does the ER maintain quality control of protein folding?
    c) Quality control of protein folding can also result in diseases such as cystic fibrosis.
    d) How does this occur?

40) Which of the following proteins only bind to intermediate filaments:

    a) Kinesins
    b) Keratins
    c) Dyneins
    d) Myosins
    e) Vimentins

41) Which statements are true for the import of protein in an organelle?
    a) Proteins are recognized by a receptor and actively transported into the nucleus in an unfolded conformation.
    b) Signal sequences are found on some proteins to transport them from the ER to the cytosol.
    c) Proteins are delivered directly from the cytosol to the peroxisomes.
    d) vSNARES and tSNARES tightly bound conformation provides the energy for removing water from between the membrane and allowing the membrane of the vesicles to fuse.
    e) The ER modifies oligosaccharides that were added on the proteins in the trans-golgi network.

42) Answer the following questions based on the graph.



    a) Where is the K_b the highest and why?
    b) Extend the graph based on the following: the protein stathmin is added in significant amounts to affect depolymerization.

c) Assuming the negative end of the microtubule is connected on a centrosome and a nucleating protein is introduced, what effect would then adding stathmin have?

43) Which are true regarding the components of the cytoskeleton?

a) Microtubules are the largest and actin is the smallest in diameter.
b) Microtubules are the most rigid of all three types.
c) All 3 are involved in cargo/protein transport.
d) Actin is used in cell support.
e) Intermediate filaments are the most dynamic.

44) The nuclear envelope

a) Contains nuclear pores that are selective towards water soluble molecules.
b) Formed from two concentric membranes which are able to act as binding sites for chromomes.
c) Contains a nuclear lamina involved in structural support.
d) Contains an outer membrane continuous with the ER.

45) Motor Proteins

a) Belong to two families, dyneins moving away from the centrioles and kinesins moving toward the centrioles.
b) Have a tail which also determines what cargo the proteins transport.
c) Consists of two heavy chains and several smaller chains.
d) Are involved in salatory movements
e) Are involved in Brownian movements

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QUSTION BANK

Class: M.Sc. (Semester – I)

Paper Code: ZOO:4102

Paper: III – Genetics **Credit: 2**

Contributed by: Prof. Gaurav A. Khude

1. Define 'Operon'. Explain the structural organization of 'arabinose' operon in prokaryotes.
2. How do scientists figure out what gene controls a trait?
3. What does dominant vs recessive mean?
4. How does radiation damage DNA?
5. Why don't identical twins look the same?
6. Why do Rh- mothers have pregnancy risks?
7. What causes heterochromia (two different color eyes)?
8. Differentiate between 'Quantitative and Qualitative Traits
9. Explain the Hybridoma technique. Mention the role of HAT medium.
10. Explain Epistatic gene interaction with reference to Recessive epistasis.
11. 'ABO Blood group system in Humans is one the best examples of Multiple allelism' – Explain.
12. Explain with suitable example, the influence of genes and environment on quantitative inheritance.
13. Explain 'Hybridoma Technique' in brief. State its Applications.
14. Explain ABO blood group system in humans as an example of multiplealleles.
15. Explain the genetic basis of any two 'In born' Metabolic disorders.

16. Explain in brief the classical concept of gene.
17. What is polymeric gene interaction and explain?
18. What are multiple alleles explain with example of blood group?
19. Define gene mutation and its type with causes.
20. Explain physiological traits physical traits.
21. Explain genetic basis and influence environment on quantitative inheritance.
22. Differentiate between dominant and recessive epistasis.
23. Explain three point test cross with example.
24. Define gene therapy and explain uses of gene transfer technology.
25. Define epigenetics.
26. What is gene mutation?
27. Application of gene therapy.
28. What is QTL mapping?
29. Give practical Application of genetics.
30. Define duplicate dominant and duplicate recessive epistasis.
31. What is epistasis?
32. What is gene order and gene distance?
33. Enlist dominant genetic disorders.
34. Explain physiological traits.
35. What is linkage group?
36. Define gene library and gene pool.
37. What is two test cross?
38. What is test cross?
39. Explain transpons or jumping genes.
40. What is heredity?
41. What is variation?
42. What is pedigree analysis?
43. Explain back cross.
44. Explain test cross.
45. Application of test and back cross.
46. Comment on Epistatic interaction.

47. Comment on steps in monoclonal antibody production.
48. Explain use of MCA in immunotherapy.
49. Comment on MCA and Cancer.
50. Why are monoclonal antibodies not widely used?
51. How are Monoclonal antibodies used in diagnosis?
52. What can monoclonal antibodies help detect that can cause disease?
53. How does epistasis affect inheritance?
54. Comment on Epistatic interaction and Hybrid male sterility
55. Explain Polyethylene Glycol Fusion for Hybridoma production.
56. How do hybridoma cells make monoclonal antibodies?

MCQs:

1. The process of transfer of hereditary character from one generation to another is known as.....?
    A. Genes
    B. Mutation
    C. Variation
    D. Genetics
2. Who is known as father of genetics?
    A. Gregor Mendel
    B. Augustinian friar
    C. Norman Borlaug
    D. M.S Swaminathan
3. Who coined the term Mutation?
    A. James Watson
    B. Herman Joseph Muller
    C. Hugo de Vries
    D. None of the above
4. Which term of genetics represents the potential ability of a plant cell to grow into a complete plant?

A. Pluriopotency
B. Totipotency
C. Cloning
D. Variation

5. Name the chromosome found in the cells which are responsible for characters other than sex chromosomes…
    A. Autosomes
    B. Genome
    C. Mitochondrial chromosome
    D. Y chromosome
6. What do you mean by law of dominance?
    A. When offspring shows the characters of generation.
    B. When Offspring of cross breed parent only show dominant characters in F1 generation.
    C. When offspring of cross breed parent only show dominant characters in F2 generation.
    D. In F2 generation both the character which is governed by gene are separated.
7. A sudden change in the gene which is heritable from one generation to other is known as….
    A. Variation
    B. Cloning
    C. Totipotency
    D. Mutation
8. Which plant Gregor Mendel had cross breed for his experiment?
    A. Onion plant
    B. Carrot plant
    C. Pea plant
    D. Lily plant
9. The word linkage was first coined by which scientist?
    A. Barbara McClintock
    B. James Watson

C. Thomas Hunt Morgan

D. Hermann Joseph Muller

10. Which of the following process is an exception of Mendel Law?

A. Mutation

B. Variation

C. Cloning

D. Linkage

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