

CSIR Life Science Sample Questions (Part 8 of 10)

1. A monkey undergoes cerebellectomy. After the post-operative recovery, the monkey was given a task to press a bar. The possible observations are:

- Its hand would overshoot the target while reaching the bar.
- It would be unable to move forelimbs.
- It would show intention tremor while trying to press the bar.
- It would press the bar with mouth instead of hand.

Which one of the following is correct?

- 1 3
- 2 only
- 4 only
- 2 4

2. Following are some statements above low temperature stress in plant.

- Fatty acid composition of mitochondria isolated from chilling resistant and chilling sensitive plants differs significantly.
- Ratio of unsaturated fatty acids to saturated fatty acids is lower in chilling resistant species.
- The cellular water does not freeze even at -40°C , because of the presence of solutes and other antifreeze proteins.
- Heat shock proteins do not play any role during low temperatures stress.

Which one of the following combination of above statements is correct?

- 1 2
- 1 3
- 2 3
- 2 4

3. During a field study, three insects with the following characteristics were observed:
- elongate, membranous wings with netlike venation, long and slender abdomen, large compound eyes.
 - small bodied, sucking mouth parts, narrow wings fringed with setae.
 - Sclerotized forewings, membranous hindwings, chewing mouth parts

They can be identified to their respective orders as

- A-Orthoptera; B-Hemiptera; C-Coleoptera
 - A-Odonata; B-Coleoptera; C-Hemiptera
 - A-Orthoptera; B-Odonata; C-Coleoptera
 - A-Odonata; B-Thysanoptera; C-Coleoptera
4. Following are some of the statements regarding the effect of CO₂ concentration on photosynthesis in plants.
- With elevated CO₂ levels, C₃ plants are much more responsive than C₄ plants under well watered condition.
 - In C₃ plants, increasing intracellular CO₂ partial pressure can stimulate photosynthesis only over a narrow range.
 - In C₄ plants, CO₂ compensation point is nearly zero.

Which one of the following combination of above statements is correct?

- 1 2
 - 2 3
 - 1 3
 - Only 3
5. Several distinct time periods and different routes might explain the entrance of marsupials into Australia.
- Late Jurassic-early therians arrived in Antarctica-Australia where the marsupials subsequently evolved.
 - Early to middle Cretaceous-early marsupials arrived in Australia from the northern regions and then radiated in isolation.
 - Paleocene-marsupials entered Australia from South-East Asia.

d. Eocene-chance dispersal of marsupials into Australia.

Which of the following is the correct combination?

a. 1 2 3

b. 1 3 4

c. 2 3 4

d. 1 2 4

6. Intracellular transport and cytoskeletal organization of a cell is regulated by nucleotide exchange of different small molecular weight GTPase of Ras super family. Overexpression of which of the following GTPase modulates the actin-cytoskeleton of HeLa cells?

a. Ran in GDP bound form

b. Ran in GTP bound form

c. Rho in GTP bound form

d. Rho in GDP bound form

7. The most important property of any microscope is its power of resolution, which is numerically equivalent to D , the minimum distance between two distinguishable objects. D depends on three parameters namely, the angular aperture, a , the refractive index, N , and wavelength, of the incident light. Below are given few possible options to increase the resolution of the microscope.

a. Decrease the value of a or increase either N or λ to improve resolution.

b. Moving the objective lens closer to the specimen will decrease $\sin a$ and improve the resolution.

c. Using a medium with high refraction index between the specimen and the objective lens to improve the resolution.

d. Increase the wavelength of the incident light to improve the resolution.

Which of the following combination of above statements is correct?

a. 1 3

b. 2 3

c. 1 4

d. 3 4

8. Tumor cells were isolated from a breast cancer patient. These cells were injected into nude mice and they were divided into four groups. Group 1 received EGF receptor-conjugated with methotrexate; Group 2 received transferrin receptor-conjugated with methotrexate; Group 4 received same amount of the free drug. In which of the following cases tumorigenic index would be minimum?

- a. Free drug
- b. EGF receptor-conjugated drug
- c. Transferrin receptor-conjugated drug
- d. Mannose receptor-conjugated drug

9. Stem cell therapies are being used in regenerative medicine like forming new adult bone, which usually does not regrow to bridge wide gaps. Successful attempts have now been made in this area because the same paracrine and endocrine factors were found to be involved in both endochondral ossification and fracture repair. Few methods to achieve the above are given below:

- a. Develop a collagen gel containing plasmids carrying the human parathyroid hormone gene and place in the gap between the ends of the broken leg.
- b. Develop a gel matrix disc containing genetically modified stem cells to secrete BMP4 and VEGF-A and implant it at the site of the wound.
- c. Make scaffolds of material that resemble normal extracellular matrix that could be molded to form the shape of a bone needed and seed them with bone marrow stem cell.
- d. Develop a collagen gel containing plasmids carrying the human bone marrow cells and place them between the ends of the bones.

Which of the above methods would you employ to develop a new functional bone in patients with severely fractured bones.

- a. 1 2
- b. 1 2 3
- c. 1 3
- d. 3 4

10. In case of morphallactic regeneration:

- a. there is repatterning of the existing tissues with little new growth

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- b. there is repatterning of the existing tissues after the stem cell division has taken place
- c. there is cell division of the differentiated cells which maintain their differentiated state to finally form a complete organism.
- d. there is dedifferentiation of the cells at the cut surface which become undifferentiated. These undifferentiated cells then divide to redifferentiate to form the complete structure.

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