一、單選題（20 分）※注意：請於試卷「選擇題作答區」依題號作答。

1. A proto-oncogene is a gene _____.
   (A) from a normal cell from which an oncogene can arise
   (B) that has been picked up by an oncogenic virus
   (C) that is in the process of evolving into an oncogene
   (D) that is expressed abnormally in a tumor cell

2. Caspases are regulated to initiate apoptosis by _____.
   (A) phosphorylation　(B) dimerization
   (C) proteolytic cleavage　(D) dephosphorylation

3. Mammalian embryonic stem cells are cultured from cells taken from the _____.
   (A) 4-cell embryo　(B) inner cell mass
   (C) trophoblast cells　(D) amnion cells

4. Two sea urchin proteins were named cyclin A and B because during the embryonic cell cycle they were periodically _____.
   (A) activated and inactivated by phosphorylation and dephosphorylation
   (B) synthesized and degraded
   (C) bound and released by another protein
   (D) None of the above

5. Polar microtubules _____.
   (A) are attached to the spindle poles
   (B) pull kinetochores poleward
   (C) are attached to kinetochores
   (D) overlap in the center of the spindle

6. Which of the following correctly describes how protein kinase A can activate genes?
   (A) Nuclear protein kinase A is activated by cAMP to phosphorylate general transcription factors.
   (B) Cytosolic protein kinase A is activated by cAMP to release the catalytic subunits, which move into the nucleus and phosphorylate general transcription factors.
   (C) Cytosolic protein kinase A is activated by cAMP to release the catalytic subunits, which move into the nucleus and phosphorylate CREB.
   (D) Nuclear protein kinase A is activated by cAMP to phosphorylate CREB.

7. If you mixed developing pre-nerve cells expressing only N-cadherin on their surfaces with epithelial cells expressing only E-cadherin, what result would you expect?
   (A) All cells would mix and adhere to one another equally.
   (B) Epithelial cells would adhere in the center and nerve cells would surround them.
   (C) Nerve cells would adhere in the center and epithelial cells would surround them.
   (D) Nerve cells would adhere to one another and epithelial cells would adhere to one another.

見背面

8. In hemidesmosomes, integrins are indirectly linked to _____.
   (A) cytoplasmic intermediate filaments
   (B) actin microfilaments
   (C) lamin-rich intermediate filaments within the nucleus
   (D) microtubules

9. If a suspension of cells is frozen and fractured, the most likely path of the fracture plane will be _____.
   (A) between the cell surface and the outside solution
   (B) between the membrane and the cytoplasm of the cells
   (C) through the middle of the cytoplasm
   (D) between the two leaflets of the cell membranes

10. When does the GTP bound to α-tubulin split to GDP and Pi?
   (A) During formation of the α–β dimer
   (B) Following polymerization but before depolymerization
   (C) During polymerization of dimers onto microtubules
   (D) During depolymerization of dimers from microtubules

11. Where are most mitochondrial phospholipids synthesized?
   (A) Mitochondrial inner membrane　(B) Mitochondrial matrix
   (C) ER　(D) Golgi apparatus

12. Most peroxisomal proteins are synthesized on _____.
   (A) free ribosomes in the cytosol
   (B) rER membranes in the cytoplasm
   (C) ribosomes bound to the outer peroxisome membrane
   (D) ribosomes inside the peroxisome

13. In vesicle fusion with a target membrane, ATP hydrolysis is required to _____.
   (A) bind t- and v-SNAREs together　(B) bind SNAREs to Rabs
   (C) bind NSF to SNAP　(D) separate the bound t-and v-SNAREs

14. The sequence Lys-Asp-Glu-Leu (KDEL) serves to retain proteins in the ER by _____.
   (A) preventing their packaging into vesicles destined for the Golgi
   (B) binding the SRP receptor in the ER membrane
   (C) binding to receptors within the membranes of the ER and Golgi, which retain them or return them to the ER
   (D) associating with the lipids in the ER membrane

15. The associations of lamins with the inner nuclear envelope membrane is via _____.
   (A) lamin binding to proteins in the nuclear envelope membrane
   (B) GPI anchors on lamins
   (C) lipid tails on lamins
   (D) Both A and C

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16. Eukaryotic ribosomes recognize and initially bind to what structure on the mRNA?
(A) The 7-methylguanosine cap　　(B) A Shine-Dalgarno sequence
(C) A TATA sequence　　(D) An AUG initiation codon

17. *DNA methylation patterns and their resulting genetic imprinting are inherited by which of the* following mechanisms?
(A) Enzymes put a methyl group on cytosine residues of newly replicated CpG sequences paired with G-methyl-C sequences.
(B) Methyl-CTP is incorporated into DNA during replication only across from a G-methyl-C sequence.
(C) When its gene is activated, a methyl group is added to certain CpG sequences in the promoter region.
(D) None of the above

18. Telomerase is _____.
(A) a reverse transcriptase
(B) the enzyme that adds a unique sequence onto the ends of chromosomes
(C) an enzyme first discovered in *Tetrahymena*
(D) All of the above

19. To clone a large (>100 kb pairs) eukaryotic DNA sequence in a yeast, one would use a _____.
(A) cosmid　　(B) yeast plasmid
(C) yeast artificial chromosome　　(D) polymerase chain reaction.

20. Electron microscopes have an advantage over light microscopes because _____.
(A) electron microscopes allow the viewer to examine living cells
(B) the wavelength of electrons is shorter than that of light
(C) electron microscopes have a larger objective aperture
(D) electron microscopes are easier to use

二、蛋白質糖化分為 N-linked 與 O-linked 二大類，請比較這二種糖化作用在連接方式、形成步驟以及結構上的差異(20%)

三、名詞解釋 (10%)
(1) Mass spectrometry
(2) Allosteric regulation

四、Why does anti-angiogenic therapy hold so much promise for treatment of tumors? (10%)

五、How does water enter a cell from the extracellular space? (10%)

六、The expression of gene X requires the binding of two proteins at the promoter region. What approaches can be used to study the binding sites of these two proteins? (10%)

七、Please describe the functions of peroxisomes. (10%)

八、How is a protein transported across the nuclear pore complex? (10%)

試題隨卷繳回