Decide which is the BEST answer and blacken the corresponding brackets. (4 MARKS EACH)

1. Which of the following statements is FALSE?

1) microtubules can contain tubulin
2) *microtubules form a network around the peripheries of the cell
3) microfilaments can contain actin
4) microfilaments play a role in cell shape
5) some intermediate filaments contain lamins

2. Which of the following statements is FALSE?

1) Mitochondria contain an inner and outer membrane.
2) *Mitochondria contain degradative enzymes that degrade unwanted molecules.
3) Mitochondria contain oxidative enzymes that generate ATP.
4) Mitochondria are the major respiratory organelles of the cell.
5) Mitochondria occupy almost a quarter of the cell volume.

3. Which of the following statements is FALSE? Provide the most accurate answer.

1) Nucleoli vary in number with biosynthetic activity.
2) *Nucleoli form around clusters of genes encoding 5S ribosomal RNA.
3) Nucleoli are not surrounded by a membrane.
4) Nucleoli are relatively unstructured.
5) all of the above statements are correct.

4. The CHARGE on histones is affected by which of the following. Provide the most accurate answer.

1) phosphorylation
2) methylation
3) acetylation
4) *all of the above (a-c)
5) none of the above (a-c)

5. Which pairing is inappropriate?

1) G0 and terminal differentiation
2) G1 checkpoint and supply of growth factors
3) START and restriction point
4) density-dependent growth inhibition and cell contact
5) *cancer cells and low saturation density

6. Which of the following is NOT useful in synchronizing dividing cell populations?

1) *trypsin
2) colchisine
3) hydroxyurea
4) mitotic shake
5) FACS (fluorescence activated cell sorting)

7. Which of the following would tend to INHIBIT the onset of mitosis?

1) binding of cyclin B to Cdc2/28
2) *phosphorylation of Cdc2/28 by Wee1
3) phosphorylation of Wee1 by Cdc2/28
4) dephosphorylation of Cdc2/28 by Cdc25
5) dephosphorylation of Wee1 by Pyp1 or Pyp2

8. What is the major regulator of entry of yeast G2 cells into mitosis?

1) the level of nutrients
2) the level of Cdc2/28
3) the amount of chromosome condensation
4) completion of S-phase
5) *the level of cyclin B

9. Cln1 and Cln2 in yeast best resemble what mammalian protein in function.

1) cyclin B
2) cyclin A
3) MPF
4) Cdk4 or Cdk6

5) *cyclin D

10. Which of the following in NOT correct about p53.

1) p53 functions in growth arrest.
2) p53 functions in apoptosis.
3) p53 is induced by DNA damage.
4) *p53 regulates RB expression.
5) p53 regulates p21 expression.

11. What is the major goal of the Ras pathway in mammalian cells?

1) Induction of cAMP production
2) Induction of tyrosine kinase activity
3) Induction of GTP/GDP exchange
4) *Induction of transcription of early response genes
5) Induction of synthesis of MAP kinase

12. Complete deletion of how many of any of the following genes could lead to growth arrest?

cyclin D, p53, E2F1, RB

1) none
2) one
3) *two
4) three
5) four

13. Overexpression of how many of any of the following genes could lead to growth stimulation?

p130, Raf, p21, p53

1) none
2) *one
3) two
4) three
5) four

14. In which cellular structure can one find a “lariat”.

1) proteosome
2) mitochondria
3) nuclear pore
4) *spliceosome
5) phagosome

15. Which one of these situations involves the enzymatic process of “deamination”.

1) translation
2) transcription
3) DNA replication
4) Splicing
5) *RNA editing

16. Which one of the following codons can be recognized by a suppressor t-RNA.

1) AAA
2) *UAA
3) AUA
4) CGA
5) GGC

17. Which one of the following proteins can directly affect RNA stability and protein translation.

1) *Cytosolic aconitase
2) Gal4
3) eIF2
4) Apo-100
5) NF-Kb

18. What is the role of the U1 snRNA in splicing.

1) To bind and protect the branch points of a hnRNA

2) To dislodge the catalytically active U6 snRNA
3) To bind to the 3' end of the histone mRNA
4) To associate and activate the U4 snRNA
5) *None of the above

19. A novel transcription factor "hogtheDandA" has recently been discovered with the following properties: It possesses an alpha helix that interacts with the major groove of the DNA helix; it can homodimerize and heterodimerize with close relatives in the subfamily through hydrophobic interactions. These hydrophobic interactions are positioned at each 7 amino acids of a second alpha helix that permit protein protein associations.

1) Helix-loop-helix
2) zinc finger
3) *Leucine zipper
4) Helix-turn-helix
5) None of the above

20. Which one of the following statements about protein translation is detrimental to translation.

1) The absence of any palindromic structure on the 5' end of the mRNA.
2) the presence of a GCCGCCpuCCAUG motif in the 5' end of the mRNA.
3) *A very long 5' untranslated mRNA.
4) the presence of a CAP structure on the mRNA
5) None of the above

21. In footprinting assays which one of the following molecules must be radiolabelled to identify the binding site of a transcription factor.

1) *the 5' end of the DNA fragment corresponding to the promoter of interest.
2) the polyA of an oligonucleotide
3) the 5' end of the mRNA of the gene of interest.
4) the amino terminus of the transcription factor
5) the carboxy terminus of the transcription factor

22. One answer is incorrect.

The following are phosphoglycerides:

1) Phosphatidyl ethanolamine
2) Phosphatidyl inositol
3) Diphosphatidyl glycerol
4) Phosphatidyl glycerol
5) *Sphingomyelin

23. One answer is incorrect.

The following are phospholipids:

1) Diphosphatidyl glycerol
2) Cardiolipin
3) Sphingomyelin
4) *Galactocerebroside
5) Lecithin

24. One answer is incorrect.

Fatty acids are constituents of the following lipids:

1) Sphingomyelin
2) Triglycerides
3) *Steroids
4) Cerebrosides
5) Sphingoglycolipids

25. One answer is incorrect.

Membrane fluidity is affected by lipid composition and chemical bonding:

1) The greater the temperature the more fluid the membrane
2) The longer the acyl chain length the less fluid the membrane
3) *Carbon atoms involved in a double bond configuration of fatty acyl chains are free to rotate.
4) The greater the number of double bonds the more fluid the membrane
5) The shorter the acyl chains the less capable of packing into a rigid structure