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

1. Which statement is false?

The following fatty acid chains of phospholipids and their number of carbon atoms is as follows:

a) Arachidonate, 20
*b) Palmitate, 18
c) Oleate, 18
d) Linoleate, 18
e) Stearate, 18

2. Which statement is false?

The following principal lipids found in biological membrane and the net charge on the head group at physiological pH is as follows:

a) Cardiolipin, -2
*b) Phosphatidylcholine, -1
c) Phosphatidylethanolamine, 0
d) Phosphatidylserine, -1
e) Sphingomyelin, 0

3. Which statement is false?

At physiological pH, the following amino acids have a net charge:

a) K
b) R
c) H
*d) Q
e) D

4. Which statement is false?

The Na^+K^+ ATPase

a) is electrogenic.
b) regulates cell volume.
*c) is inhibited by curare.
d) hydrolyzes 100 ATP molecules per second.
e) uses two thirds of the energy requirement of neurons.

5. Which statement is false?

Soluble molecules are transferred across lipid bilayers by proteins known as:

a) uniporters.
b) symporters.
c) antiporters.
*d) the electrochemical gradient.
e) channels.

6. Which statement is false?

The transcellular transport of glucose across the intestinal epithelial cell

*a) represents facilitated glucose diffusion.
b) involves glucose transporters.
c) goes in the direction of the gut lumen to the blood
d) is blocked by epithelial tight junctions
e) involves the Na^+K^+ ATPase.

7. Which statement is false?

Channels:

*a) are highly selective.
b) allow diffusion along electrochemical gradient.
c) are passive.
d) reveal a rate of transport responsive to a wide range of solute concentrations.
e) are fast transporters.

8. Which statement is false?

Bacteriorhodopsin:

a) is an example of a heptahelical transmembrane proteins.
b) is a carrier.
*c) transports H^+ ions from the outside to the inside of the cell.
d) uses D residues to bind H^+ ions.
e) undergoes a conformational change in response to light.

9. Which statement is false?

The band 3 protein:

a) is a major protein of the erythrocyte plasma membrane.
b) can be visualized by freeze-fracture electron microscopy.
c) is an example of an anion transporter.
*d) helps carry O_2 from lungs to tissues and organs.
e) is a multipass membrane protein.

10. Which statement is false?

The acetylcholine receptor:

a) is a ligand gated channel.
b) consists of 4 different gene products organized as a pentamer.
c) allows 30,000 Na^+ ions to enter per msec.
d) alters the voltage gradient.
*e) is inhibited by strychnine leading to muscle contraction, convulsion and death.

11. Which statement is false?

Insertion of a polypeptide into the phospholipid bilayer:

a) occurs in the endoplasmic reticulum.
b) involves the targeting of hydrophobic alpha helices.
c) is often accompanied by N-linked glycosylation.
*d) occurs by direct cotranslational insertion into the bilayer.
e) is prohibited for a peripheral membrane protein.

12. Which statement is false?

Phospholipids are distributed asymmetrically across the bilayer as follows:

a) phosphatidylethanolamine, inner leaflet.
b) sphinegomyeline, outer leaflet.
c) phosphatidylcholine, outer leaflet.
d) phosphatidylserine, inner leaflet.
*e) none of the above.

13. Which of these statements is FALSE?

The helix-loop-helix transcription factors:

*a) are sequence specific because they recognize the phosphate backbone of DNA.
b) bind DNA via hydrogen bonding.
c) possess at least one recognition helix that fit into the major groove of DNA.
d) contain certain amino acids in the recognition helix that are linked with the nucleotide bases of DNA.
e) in dimers, the two recognition helixes recognize DNA in two successive major grooves separated by 10 nucleotides.

14. Which one of these statements is FALSE?

a) Cleavage of hnRNA occurs 10 to 20 bases at the 3' side of the AAUAAA signal.
b) Adenylation is performed by a specific enzyme named poly Adenylase.
c) The polyA segment of mRNA is covered with a basic protein.
*d) Polyadenylation of mRNA is always essential for their stability and transport to the cytoplasm.
e) Both AAUAAA and AUUAAA can be used as signals of polyadenylation

15. Which one of these translation factors is cleaved by a protease during poliovirus infection?

a) eIF2
*b) p220
c) eIF4e

d) eIF5
e) eIF3

16. Which of these answers is TRUE?
Translation can be upregulated by phosphorylating;

*a) BP1
b) eIF2b
c) eIF2
d) p220
e) eIF4e

17. Which of these statements is FALSE:

a) The presence of PEST motif in a protein sequence promotes its degradation.
b) The N-rule of protein stability suggest that if the amino terminus amino acid is a hydrophobic amino acid, this protein will have a longer half-life.
c) Phosphorylation of IKB induces its degradation, and allows NFKB to migrate to the nucleus.
*d) Multimeric attachment of ubiquitin to proteins prevents their attachment to proteasome thus reducing their half-life.
e) The cleavage of PTP1b carboxy terminus tail allows its cellular relocalization.

18. Which one of these translation factors is the target protein for the Hemin Controlled Inhibitor kinase?

*a) eIF2
b) eIF2b
c) eIF4e
d) eIF5
e) eIF3

19. Which of these statements is FALSE? (3 POSSIBLE ANSWERS)

The zinc finger transcription factors:

a) contain zinc finger motif that are made with 2 beta sheets and one alpha helix.
*b) do not bind DNA via their beta sheets.
*c) contain zinc finger motifs that are stabilized by a zinc atom attached to 5 different amino acids.
d) possess on each zinc finger motif only one recognition helix that links with DNA.
*e) The zinc atom stabilizes the zinc finger motif by attaching two amino acids of each beta sheet.

20. Which one of these answers identify all the ribosomal RNA present in a mammalian ribosome?

*a) 28S, 5S, 5.8S, 18S
b) 16S, 5S, 25S
c) 28S, 5S, 25S, 5.8S
d) 7S, 12S, 28S
e) 28S, 5S, 18S

21. Which one of these nucleotide motifs is important for translation?

a) CAAT
b) AAAUAA
c) TATAA
d) GUAAAUUUAG
*e) none of the above

22. The nucleolus can be described as:

1) The organelle within the cell containing chromosomes and other nuclear material.
2) The membrane-bound organelle within the nucleus containing newly synthesized RNA.
*3) A region in the nucleus containing ribosomal RNA genes and newly synthesized ribosomal RNA.
4) Any one of several regions in the nucleus containing small ribosomal subunits.
5) A region in the nucleus containing fibrils and/or granules of chromatin.

23. Which of the following statements is correct?

1) Euchromatin contains highly compacted DNA which is poorly expressed.
2) Heterochromatin contains ‘extended’ DNA which is more readily expressed.
*3) Facultative heterochromatin contains DNA which goes from the compacted to the extended state at different phases of the cell cycle.
4) All of answers 1-3 are correct.
5) None of answers 1-3 are correct.

24. Which of the following statements is FALSE?

1) Histones are highly basically charged.
*2) Histones bind to specific promoter sequences and regulate gene expression.
3) Eukaryotes contain five major classes of histones, H1, H2A, H2B, H3 and H4.
4) The central core of nucleosomes is comprised largely of histones H2A, H2B, H3 and H4.
5) The core of nucleosomes is made up of a histone octomer.

25. Which of the following histone modifications is NOT believed to be involved with chromatin condensation/decondensation?

1) phosphorylation
2) ADP ribosylation
3) acetylation
*4) acylation
5) methylation