Roll No:
Application No:
Name:
Exam Date: **06-Oct-2020**
Exam Time: **09:00-12:00**
Examination: **1. Course Code - Ph.D.**
2. Field of Study - Molecular Medicine (CMMH)

SECTION 1 - SECTION 1

Question No.1 (Question Id - 29)
Quorum Sensing was first reported in *Aliivibriofischeri*. This is described as :

(A) ◯ Cell to cell communication system in gram negative bacteria
(B) ◯ A signaling system in biofilms
(C) ◯ A process that helps bacteria sense quorum
(D) ◯ **All of the above (Correct Answer)**

Question No.2 (Question Id - 45)
Increases in concentration of the second messenger cAMP may lead to the activation of :

(A) ◯ cyclic nucleotide-gated ion channels
(B) ◯ popeye domain containing proteins
(C) ◯ protein kinase A
(D) ◯ **all of the above (Correct Answer)**

Question No.3 (Question Id - 35)
Typical examples of human zymogens are :

(A) ◯ Trypsinogen
(B) ◯ Proelastase
(C) ◯ Prolipase
(D) ◯ **All of the above (Correct Answer)**

Question No.4 (Question Id - 9)
The phenol-chloroform method of DNA extraction depends on the fact that :
(A) ◯ Water and phenol mixture create non-polar solvent
(B) ◯ Phenol is lighter than water
(C) ◯ **DNA is a polar molecule with a net negative charge (Correct Answer)**
(D) ◯ None of the above

Question No.5 (Question Id - 27)
Q-cytochrome c oxidoreductase is also called :
(A) ◯ **complex III (Correct Answer)**
(B) ◯ cytochrome cII reductase
(C) ◯ cytochrome bc3 complex
(D) ◯ none of the above

Question No.6 (Question Id - 12)

Newton's second law states that :

(A) ○ the acceleration of an object is dependent indirectly upon the net force acting upon the object

(B) ○ **the acceleration of an object is dependent upon the net force acting upon the object and the mass of the object**

(Correct Answer)

(C) ○ the acceleration of an object does not depend on the mass of the object

(D) ○ none of the above

Question No.7 (Question Id - 17)

The complete Freund's Adjuvant contains :

(A) ○ **inactivated *Mycobacterium tuberculosis* (Correct Answer)**

(B) ○ heat killed *Escherichia coli*

(C) ○ Lipopolysaccharides from *Escherichia coli*

(D) ○ None of the above

Question No.8 (Question Id - 41)

The linear magnification of eyepiece and objective lens of a microscope is 20x and 10x respectively. Therefore, the net magnification of the microscope will be

(A) ○ 20x

(B) ○ 30x

(C) ○ **200x (Correct Answer)**

(D) ○ 10x

Question No.9 (Question Id - 13)

Choose the statement that correctly applies to the Joule-Thomson effect :

(A) ○ The principle of Joule-Thomson effect helps explain the change in temperature that accompanies expansion of a gas without transfer of heat

(B) ○ The principle of Joule-Thomson effect is often utilized in liquefying gases

(C) ○ Joule-Thomson effect is also called as Kelvin-Joule effect or Joule-Kelvin effect

(D) ○ **All of the above (Correct Answer)**

Question No.10 (Question Id - 11)

The Brønsted-Lowry theory describes :

(A) ○ the law of constant proportions

(B) ○ **an acid is a molecule or ion that can donate a proton (Correct Answer)**

(C) ○ the pressure of a given mass of an ideal gas is inversely proportional to its volume

(D) ○ none of the above

Question No.11 (Question Id - 33)

Mitogen-activated protein kinases (MAPKs) are :

(A) ○ Serine/threonine kinases

(B) ○ Respond to extracellular stimuli (mitogens)
(C) ○ Regulate various mitosis, differentiation and apoptosis.
(D) ○ **All of the above (Correct Answer)**

Question No.12 (Question Id - 50)
Cytochromes play important roles in electron transport chain. The following applies role of cytochromes during oxidative phosphorylation.

(A) ○ Globular Cytochrome C is important for complex III and complex IV
(B) ○ Complex III itself is composed of a b-type cytochrome
(C) ○ Complex III itself is composed of a a-type cytochrome
(D) ○ **All of the above (Correct Answer)**

Question No.13 (Question Id - 20)
RNA dependent RNA polymerase is NOT found in which of the following viruses ?

(A) ○ Dengue virus
(B) ○ Chikungunya virus
(C) ○ SARS-COV 2 virus
(D) ○ **Human Immunodeficiency virus (Correct Answer)**

Question No.14 (Question Id - 34)
Glia, also called glial cells in the central nervous system are :
(A) ○ non-neuronal cells
(B) ○ do not produce electrical impulses
(C) ○ important since they supply nutrients and oxygen to neurons
(D) ○ **all of the above (Correct Answer)**

Question No.15 (Question Id - 43)
T helper type 2 (Th2) cells are a distinct lineage of CD4+ effector T cells, which secretes :

(A) ○ **IL-4 (Correct Answer)**
(B) ○ IL-1
(C) ○ IL-6
(D) ○ All of the above

Question No.16 (Question Id - 32)
Angiogenesis is the physiological process which is important in :

(A) ○ generation of new blood vessels

(B) ○ wound healing
(C) ○ tumor progression
(D) ○ **all of the above (Correct Answer)**

Question No.17 (Question Id - 38)
Chromatin immunoprecipitation (ChIP) is used to study interaction between proteins and DNA. The following statement correctly applies to the assay :

(A) ◯ **In cross-linked ChIP (XChIP) chromatin sheared by sonication is used (Correct Answer)**
(B) ◯ In cross-linked ChIP (XChIP) purified whole chromatin is used
(C) ◯ In Native ChIP (NChIP) native chromatin sheared by sonication is used
(D) ◯ All statements are correct

Question No.18 (Question Id - 23)
The mechanisms of resistance to chloramphenicol are :
(A) ◯ reduced membrane permeability
(B) ◯ mutation of the 50S ribosomal subunit
(C) ◯ elaboration of chloramphenicol acetyltransferase
(D) ◯ **all of the above (Correct Answer)**

Question No.19 (Question Id - 37)
The subunits of human NF-KB (nuclear factor kappa-light-chain-enhancer of activated B cells) are :

(A) ◯ **c-Rel (Correct Answer)**
(B) ◯ Rel D
(C) ◯ b-Rel
(D) ◯ e-Rel

Question No.20 (Question Id - 30)
What volume of 0.05 M H_2SO_4 will be required to completely neutralize 15 ml of 0.2 N NaOH solution ?

(A) ◯ **30 ml of 0.05 M H_2SO_4 (Correct Answer)**
(B) ◯ 0.1 ml of 5 M H_2SO_4
(C) ◯ 3 ml of 1 M H_2SO_4
(D) ◯ 30 ml of 0.5 M H_2SO_4

Question No.21 (Question Id - 2)
Chromatin immunoprecipitation is :

(A) ◯ **commonly abbreviated as ChIP assays (Correct Answer)**
(B) ◯ used for RNA-protein binding assays
(C) ◯ used for karyotyping assays
(D) ◯ all of the above

Question No.22 (Question Id - 48)
Sumoylation of proteins is a post-translational modification where proteins are conjugated with :

(A) ◯ ubiquitin
(B) ◯ **small ubiquitin-like modifiers (Correct Answer)**
(C) ◯ secretory ubiquitin methylation
(D) ◯ none of the above

Question No.23 (Question Id - 4)
One nanometer (nm) is equal to :

(A) ◯ one millionth of a millimeter (mm)
(B) ◯ one-billionth of a meter (m)
(C) ◯ one thousand picometer (pm)
(D) ◯ **all of the above (Correct Answer)**

Question No.24 (Question Id - 25)
Succinate-Q oxidoreductase is characterized by :
(A) ◯ the term complex III
(B) ◯ being the first entry point to the electron transport chain
(C) ◯ **being the only enzyme that is part of both the citric acid cycle and the electron transport chain**

(Correct Answer)
(D) ◯ all of the above

Question No.25 (Question Id - 18)
Two proteins of the same molecular weight, size, shape and charge can still be separated by :

(A) ◯ Gel filtration chromatography
(B) ◯ **Affinity chromatography (Correct Answer)**
(C) ◯ Ion-exchange chromatography
(D) ◯ Thin layer chromatography

Question No.26 (Question Id - 14)
The Second Law of Thermodynamics states that :
(A) ◯ **entropy constantly increases in a closed system (Correct Answer)**
(B) ◯ energy can neither be created nor destroyed: it can only change form
(C) ◯ entropy constantly decreases in a closed system
(D) ◯ none of the above

Question No.27 (Question Id - 31)
The function of adrenocorticotropic hormone is to :
(A) ◯ Stimulate secretion of pepsin
(B) ◯ Stimulate neuro-transmission
(C) ◯ **Stimulate secretion of steroid hormones (Correct Answer)**
(D) ◯ None of the above

Question No.28 (Question Id - 22)
Nalidixic acid is a synthetic quinolone antibiotics. It functions as :

(A) ◯ Protein synthesis inhibitor in gram negative bacteria
(B) ◯ Membrane disruption agent in gram positive bacteria
(C) ◯ Inhibitor of bacterial motility
(D) ◯ **None of the above (Correct Answer)**

Question No.29 (Question Id - 28)
Toll like Receptors (TLRs) are fundamental determinants of innate immunity. A possible ligand for TLR is :

(A) ◯ Teichoic acids of gram negative bacteria

(B) ○ **Pathogen Associated Molecular Patterns (Correct Answer)**
(C) ○ Viral Lipopolysaccharides
(D) ○ All of the above

Question No.30 (Question Id - 46)
The theoretical maximum yield of ATP through oxidation of one molecule of glucose in glycolysis, citric acid cycle, and oxidative phosphorylation is :

(A) ○ 36
(B) ○ **38 (Correct Answer)**
(C) ○ 40
(D) ○ 28

Question No.31 (Question Id - 15)
Reverse Phase High Performance Liquid Chromatography (RP-HPLC) commonly uses C18 and C8 columns. Select the incorrect statement about these columns :

(A) ○ C18 has a longer carbon chain while C8 has a shorter carbon chain
(B) ○ **C18 has a lower retention while C8 has a higher retention (Correct Answer)**
(C) ○ **C18 has a higher hydrophobicity, then C8 (Correct Answer)**
(D) ○ **Both columns use organic solvents in their mobile phase (Correct Answer)**

Question No.32 (Question Id - 3)
Streptavidin and Biotin are widely used in molecular biology assays. This is because :

(A) ○ Streptavidin homo-tetramers bind to vitamin B_7 with high affinity
(B) ○ The dissociation constant (K_d) of Streptavidin-biotin binding is on the order of $\approx 10^{-14}$ mol/L
(C) ○ Streptavidin-biotin complex is relatively resistant to organic solvents
(D) ○ **All of the above (Correct Answer)**

Question No.33 (Question Id - 16)
Nonsteroidal anti-inflammatory drugs (NSAIDs) are members of a drug class that :

(A) ○ **inhibit cyclooxygenase enzymes (COX-1 or COX-2) (Correct Answer)**
(B) ○ upregulate the synthesis of prostaglandins
(C) ○ decrease risk of gastrointestinal ulcers upon prolonged use
(D) ○ all of the above

Question No.34 (Question Id - 21)
Cycloheximide is a naturally occurring fungicide produced by the bacterium Streptomyces griseus. It is used in molecular biology experiments because it can be used to :

(A) ○ Interfere with eukaryotic translational elongation
(B) ○ Ribosome profiling/translational profiling
(C) ○ Study the half-life of a protein

(D) ○ **All of the above (Correct Answer)**

Question No.35 (Question Id - 47)
The measure of the total binding strength of an antibody at every binding site is termed as :

(A) ○ Affinity
(B) ○ **Avidity (Correct Answer)**
(C) ○ Titer
(D) ○ None of the above

Question No.36 (Question Id - 7)
Choose the number of moles of the product formed in the following chemical reaction :
$Al_4C_3 + 12H_20 =$ _____ $+ 3CH_4$

(A) ○ Al_2OH_2
(B) ○ $4AlO_2$
(C) ○ $4Al(OH)_2$
(D) ○ **None of the above (Correct Answer)**

Question No.37 (Question Id - 10)
Curcumin, the primary bioactive substance in turmeric is :

(A) ○ made by Curcuma longa plants
(B) ○ a natural polyphenol
(C) ○ a phyto-medicine with anti-inflammatory properties
(D) ○ **all of the above (Correct Answer)**

Question No.38 (Question Id - 6)
EDTA is a chemical that chelates minerals and metals. The full form of EDTA is :

(A) ○ Ethyldimethyltetraacetic acid
(B) ○ Ethylenediaminetriacetic acid
(C) ○ Ethoxydioxytriacetic acid
(D) ○ **Ethylenediaminetetraacetic acid (Correct Answer)**

Question No.39 (Question Id - 24)
Choose which of the following events occur during oxidative phosphorylation :

(A) ○ electrons are transferred from electron donors to electron acceptors such as oxygen in redox reactions
(B) ○ redox reactions release the energy stored in the relatively weak double bond of O_2
(C) ○ reactive oxygen species such as superoxide and hydrogen peroxide is formed
(D) ○ **all of the above (Correct Answer)**

Question No.40 (Question Id - 42)
Koch's postulates for infectious disease states that :
(A) ○

The microorganism must be found the organism suffering from the disease, but should not be found in healthy organism.

(Correct Answer)

(B) ○ The microorganism must be isolated from the asymptomatic and symptomatic organisms suffering from the disease

(C) ○ The cultured microorganism should not cause disease when infected in an organism resistant to the disease

(D) ○ All of the above

Question No.41 (Question Id - 36)

A leucine zipper is a common three-dimensional structural motif in proteins. The following statement that best apply to these proteins :

(A) ○ Leucine zippers are α-helices that contain a leucine residue every seventh amino acid.

(B) ○ This motif is found in many eukaryotic transcription factors.

(C) ○ Zing fingers are not leucine zipper proteins

(D) ○ **All of the above statements are correct (Correct Answer)**

Question No.42 (Question Id - 1)

An endospore forming bacteria may be isolated from a mixture of non-sporulating bacteria in solution using the following technique :

(A) ○ exposing the solution to sunlight for 15 min.

(B) ○ **boiling the sample at 80°C for 20 min. (Correct Answer)**

(C) ○ incubating the sample in 10% formaldehyde for 1 h.

(D) ○ exposing the solution to gamma-radiation for 15 min.

Question No.43 (Question Id - 19)

Post-translational modifications of a biological molecule in a living cell can be studied by :

(A) ○ Nexgen sequencing

(B) ○ **Proteomics (Correct Answer)**

(C) ○ Transcriptomics

(D) ○ Polymerase Chain Reaction

Question No.44 (Question Id - 26)

The type II secretion system is a membrane bound protein complex found in Gram-negative bacteria. The following apply to this complex :

(A) ○ It has an outer membrane complex made up by the secretin GspD.

(B) ○ GspD are β-barrels shaped structures in the bacterial membrane

(C) ○ GspD creates a pore in the outer membrane of the bacterial cell

(D) ○ **All of the above (Correct Answer)**

Question No.45 (Question Id - 40)
The amount of a peptide with molecular weight 300 daltons required to make a 10mM solution in 1mL water is :

(A) ◯ 3 µg
(B) ◯ **3 mg (Correct Answer)**
(C) ◯ 300 mg
(D) ◯ 10 mg

Question No.46 (Question Id - 8)
A Grignard reagent has a generic formula R-Mg-X, where X is a halogen and R is an organic group. These reagents are :

(A) ◯ widely used in organic synthesis for creating new carbon-carbon bonds
(B) ◯ good nucleophiles
(C) ◯ normally handled as solutions in solvents like diethyl ether or tetrahydrofuran
(D) ◯ **all of the above (Correct Answer)**

Question No.47 (Question Id - 49)
Escherichia coli Strain Nissle 1917 is :
(A) ◯ **a probiotic strain (Correct Answer)**
(B) ◯ an EPEC strain
(C) ◯ an EHEC strain
(D) ◯ none of the above

Question No.48 (Question Id - 44)
A person with fever checks at 39°C. This means the temperature of this person is :

(A) ◯ **102.2°F (Correct Answer)**
(B) ◯ 103.4°F
(C) ◯ 101°F
(D) ◯ None of the above

Question No.49 (Question Id - 39)
The natural antibiotic present in mother's milk of homo sapiens is :
(A) ◯ Granzyme
(B) ◯ Lipid A
(C) ◯ **Lactoferrin (Correct Answer)**
(D) ◯ Hepcidin

Question No.50 (Question Id - 5)
What is 98.6 °F in degrees Celsius ?
(A) ◯ **37.0°C (Correct Answer)**
(B) ◯ 30.0°C
(C) ◯ 100.0°C
(D) ◯ None of the above

Save & Print