BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI-HYDERABAD CAMPUS
FIRST SEMESTER 2019-20
BIO G512: MOLECULAR MECHANISMS OF GENE EXPRESSION
Surprise Quiz 2 (Closed-Book) Date: 19-09-2019 Marks: 10 Duration: 20 Minutes

Name:_____ ID No._____

Please circle or write the most appropriate answer (10 x 1=10 marks)

The answers are marked or written in bold font

1. When DNA replication proceeds bidirectionally from a point of replication initiation, which of the following statements are true.
I. DNA replication of leading strand takes place in 5'-3' direction
II. DNA replication of lagging strand takes place in 3'-5' direction
III. The strand which acts as leading strand for replication in one direction will not act as leading strand for replication proceeding in the opposite direction
a) I and II only b) II and III only **c) I and III only** d) All of the above

2. Which of the following statements in general are true?
I. Gain-of-function mutation in a tumor suppressor gene could lead to cancer
II. Gain-of-function mutation in a protooncogene gene could lead to cancer
III. Loss-of-function mutation in a tumor suppressor gene could lead to cancer
IV. Loss-of-function mutation in a protooncogene could lead to cancer
a) I & III **b) II & III** c) I & IV d) II & IV

3. Based on partial sequences given, which of the following CANNOT be a 12 bp palindromic sequence?
a) GCCGCCG b) TAATAAT **c) ATTCATT** d) GCGATTA

4. In creating 'Phosphomimics' amino acid_____(I)_____is replaced by amino acid____(II)____.
Among the given pool of amino acids, pick one amino acid each for (I) and (II).
Given amino acids are: Tyrosine, Glutamate, Aspartate, Serine
Answer: **(I) Tyrosine or Serine** **(II) Glutamate or Aspartate**

5. Which of the following epigenetic marks in general are associated with transcriptional gene silencing in eukaryotes?
I. Deacetylation II. Cytosine methylation of promoters
III. Specific Histone Lysine methylation
a) I and II only b) II and III only c) I and III only **d) All the above**

6. Known DNA polymerases have been shown to possess which of the following activities?
I. 5' to 3' polymerase activity II. 5' to 3' exonuclease activity
III. 3' to 5' polymerase activity IV. 3'-5' exonuclease activity
a) I, II and III b) II, III and IV **c) I, II and IV** d) I, III and IV

7. Assume that an autosomal gene G is genomically imprinted in father but not in mother. Then which of the following is/are true for this couple?
I. Their son will receive one copy of the imprinted G gene but not their daughter
II. Their daughter will receive one copy of the imprinted G gene but not their son
III. Both their son and daughter will receive one copy of imprinted gene G
IV. All children of their daughter will receive one copy of imprinted gene G (assume that theird daughter's son is not contributing any imprinted gene)
a) I and IV b) II and IV c) III and IV **d) III only**

8. Which of the following is true about an insulator?
a) The effect of an insulator may result in silencing of the gene which it is insulating
b) The effect of an insulator may result in expression of the gene which it is insulating
c) The effect of an insulator may result either in expression or silencing of the gene which it is insulating
d) Insulator has no effect on the expression of the gene which it is insulating

9. Assume that DNA polymerase called DP1 is used to synthesize 5 Kb long DNA, similarly DP2 to to synthesize 10 Kb long DNA and DP3 to synthesize 15 Kb long DNA. The number of point mutations (base-pair substitutions) found for DP1, DP2 and DP3 were 5, 9 and 16, respectively. Then the correct ranking of the three polymerases based on their fidelity is:
a) DP1>DP2>DP3 **b) DP2>DP1>DP3** c) DP3>DP2>DP1 d) DP1=DP2=DP3

10. Which of the following is correct about DNA methylation based on what has been known so far?
I. Cytosine methylation is more common in eukaryotes than in prokaryotes
II. Cytosine methylation is more common in prokaryotes than in eukaryotes
III. Adenine methylation is more common in prokaryotes than in eukaryotes
IV. Adenine methylation is more common in eukaryotes than in prokaryotes
a) I and III b) I and IV c) II and III d) III and IV