**ST MARY’S UNIVERSITY**

**TWICKENHAM, LONDON**

MSc Degree Examination students registered for

Level **SEVEN**

Title**: Principles of Molecular Biology**

Code: **NGE7001**

Semester: **ONE**

Date: **January 7th 2019**

Time: **1:30 – 4:30PM**

TIME ALLOWED: **THREE** HOURS

**Section A: Answer all questions in this section. There is one correct answer for each question (2 marks each). Please answer all questions in your answer booklet.**

1. Translocation of NFkB to the nucleus requires:
2. Formation of a heterodimer with RXR
3. Transportation using mRNA
4. Attachment of NFkB and IkBa
5. None of the above
6. A haplotype block is:
7. a series of adjacent alleles in strong disequilibrium
8. a series of adjacent alleles in strong equilibrium
9. a series of distant alleles in strong disequilibrium
10. a series of distant alleles in strong equilibrium
11. Which of the following statements is correct?
12. Chromatin is smaller than nucleosomes
13. Nucleosomes are smaller than condensed chromatin loops
14. Chromatin loops are smaller than nucleosomes
15. None of the above
16. Which of the following statements is correct?
17. DNA Polymerase III always adds nucleotides to the C5 hydroxyl group
18. DNA Polymerase III always adds nucleotides to the C3 hydroxyl group
19. DNA Polymerase III always moves in a 3’-5’ direction in the new strand
20. DNA Polymerase III always moves in a 5’-3’ direction in the template strand
21. DNA damage that occurs in newly synthesised DNA is mostly repaired by:
22. Nucleotide repair
23. Non-homologous end joining
24. Base excision repair
25. Mismatch repair
26. Transcription factors:
27. act always downstream from the gene being transcribed
28. are exceptionally useful because they always regulate the same genes in different cells in a consistent manner
29. are always inherited
30. None of the above
31. A spliceosome:
32. has three binding sites (E, P, A)
33. is responsible for the translation of codon into amino acids
34. connects introns together
35. none of the above
36. A set of polymorphisms that tends to be inherited together is called a:
37. linkage equilibrium
38. haplotype
39. single nucleotide polymorphism
40. none of the above
41. Increased activity of NFkB:
42. induces synthesis of anti-apoptotic genes
43. decreases cell survival
44. both a and b are correct
45. neither a nor b are correct
46. Arrange the following proteins in the proper order in which they participate in DNA replication.

1 = Primase; 2 = Helicase; 3 = Single-strand binding proteins; 4 = DNA polymerase I

1. 2, 3, 1, 4
2. 2, 1, 3, 4
3. 2, 3, 4, 1
4. 2, 1, 4, 3
5. A centimorgan is defined as:
6. the distance between chromosome positions for which the expected average number of intervening chromosomal crossovers in 100 generations is 0.01
7. It is defined as the distance between chromosome positions for which the expected average number of intervening gene crossovers in a single generation is 0.01
8. the distance between chromosome positions for which the expected average number of intervening chromosomal crossovers in a single generation is 0.01
9. none of the above
10. During DNA transcription, the anti-sense strand:
11. is read in a 5’-3’ direction
12. is the same as the coding strand
13. is the same as the RNA transcript
14. none of the above
15. Define the type of Single Nucleotide Polymorphism in the following diagram:



1. Missense
2. Nonsense
3. Silent
4. None of the above
5. What is the difference between a mutation and a polymorphism?
6. A polymorphism is a genetic variation in more than 1% of genes
7. A mutation is a genetic variation in less than 1% of genes
8. A polymorphisms is a genetic variation in less than 1% of the population
9. A mutation is a genetic variation in less than 1% of the population
10. Which of the following is not a type of genetic variation?
11. Small insertions and deletions
12. Microsatellites
13. Exon tandem repeats
14. Long tandem repeats

**Section B:** **Answer TWO questions from this section (35 marks each).**

1. Provide an in-depth overview of epigenetic mechanisms including nutrition examples (25 marks). Define genomic imprinting (5 marks) and chromosome X inactivation (5 marks).
2. Provide an in-depth description of the process of transcription (25 marks). In your answer, include differences between DNA replication and transcription (5 marks) and possible post-translational modifications (5 marks).
3. Provide an overview of transcription factors (5 marks) and explain the mechanism of action of PPARs (15 marks) and NFkappaB (15 marks)

**END OF EXAMINATION**