**ST MARY’S UNIVERSITY**

**TWICKENHAM, LONDON**

MSc Degree Examination students registered for

Level **SEVEN**

Title**: Genetics in Health and Disease**

Code: **NGE7002**

Semester: **ONE**

Date: **January 14th 2019**

Time: **9:30AM – 12:30PM**

TIME ALLOWED: **THREE** HOURS

**Section A: Answer all questions in this section.** There is one correct answer for each question (2 marks each). Provide your answers as a list in your examination answer booklet.

1. Mutations in the *p53* gene can be:
2. Inherited
3. Sporadic
4. found in approximately 50% of all tumours
5. all of the above
6. According to the modern theory of evolution, gradual accumulation of small genetic changes usually results in
7. Speciation
8. Linkage disequilibrium
9. Mutations
10. None of the above
11. The extent to which a particular gene or set of genes is expressed in the phenotypes of individuals carrying it, measured by the proportion of carriers showing the characteristic phenotype is called
12. Genetic divergence
13. Genetic drifting
14. Genetic equilibrium
15. Genetic penetrance
16. Which of the following is not an assumption of the Hardy-Weinberg principle?
17. Small population size
18. No migration
19. Random mating
20. All of the above are assumptions of the Hardy-Weinberg principle
21. Adoption studies in obesity have shown that:
22. adoptees’ weight is more similar to that of the biological parents than the adoptive parents
23. there is no association between BMI of non-identical twins separated at birth
24. there is a significant relationship between identical twins raised apart
25. all of the above
26. Migration changes the genetic structure by introducing new genes into a population. This phenomenon is called:
27. Mutation
28. Gene flow
29. Evolution
30. Micro-evolution
31. Around 85% of all cases of colorectal cancer are due to:
32. Mutations in the adenomatous polyposis coli (*APC*) gene
33. Mutations in DNA repair genes
34. Mutations in the *p53* gene
35. None of the above
36. Place the following atherogenic processes in the order that they appear during plaque formation:
37. Endothelial injury – LDL oxidation- Macrophage infiltration - Smooth muscle cell proliferation-Thrombosis
38. Endothelial injury – Macrophage infiltration - Smooth muscle cell proliferation-LDL oxidation –Thrombosis
39. LDL oxidation– Macrophage infiltration - Smooth muscle cell proliferation- Endothelial injury -Thrombosis
40. LDL oxidation- Macrophage infiltration - Endothelial injury- Smooth muscle cell proliferation-Thrombosis
41. Around 85% of all cases of colorectal cancer are due to:
42. Mutations in the adenomatous polyposis coli (*APC*) gene
43. Mutations in DNA repair genes
44. Mutations in the *p53* gene
45. None of the above
46. Methylation status can promote carcinogenesis through:
47. Hypomethylation of tumour suppressor genes
48. Hypermethylation of oncogenes
49. Both a and b
50. Neither a nor b
51. The extent to which a particular gene, or set of genes, is expressed in the phenotypes of individuals carrying it, and measured by the proportion of carriers showing the characteristic phenotype is called:
52. Genetic divergence
53. Genetic drifting
54. Genetic equilibrium
55. Genetic penetrance
56. According to the literature, certain single nucleotide polymorphisms in the *FTO* gene are associated with:
57. Greater food intake
58. Lowered satiety
59. Increased hunger
60. All of the above
61. Melanocortin genes are associated with:
62. Metabolic rate
63. Preference to fatty foods
64. Appetite regulation
65. All of the above
66. Which of the following is not an assumption of the Hardy-Weinberg principle?
67. Small population size
68. No migration
69. Random mating
70. All of the above are assumptions of the Hardy-Weinberg principle
71. Adoption studies in obesity have shown that:
72. adoptees’ weight is more similar to that of the biological parents than the adoptive parents
73. there is no association between BMI of non-identical twins separated at birth
74. there is a significant relationship between identical twins raised apart
75. all of the above

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

1. Discuss the role and importance of single nucleotide polymorphisms in the FTO and MC4R genes in relation to weight management **(35 marks)**.
2. Provide a detailed overview of breast cancer with emphasis on risk factors, including genetic **(25 marks)**. Discuss the role of adiposity in relation to breast cancer **(10 marks)**.
3. Discuss the relationship between transcription factor 7-like 2 (TCF7L2) polymorphisms and metabolic syndrome risk **(15 marks).** Discuss whether dietary fat composition modulates these associations **(20 marks)**.

**END OF EXAMINATION**