**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: **01 July 2019**

Time: **09:30-12:30pm**

TIME ALLOWED: **THREE** HOURS

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

Please provide your answers for section **A** as a list in your answer booklet, do not answer on this exam paper.

1. A disease or condition present among a population at all times is called:
2. an endemic
3. a pandemic
4. a cluster
5. none of the above
6. What pattern does this pattern of inheritance follow?



1. Autosomal dominant
2. Autosomal recessive
3. X-linked dominant
4. X-inked recessive
5. The phenomenon of genetic change through chance alone in a population, is called:
6. Genetic drifting
7. Natural selection
8. Genetic divergence
9. Migration
10. According to the Hardy-Weinberg equation, the gene pool of which type of a population remains constant over multiple generations?
11. Evolving
12. Non-evolving
13. Divergent
14. Non-divergent
15. Which of the following is not a step in the process of atherogenesis?
16. Macrophage accumulation
17. Vascular smooth muscle cell apoptosis
18. Platelet oxidation
19. Monocyte migration
20. Mutations in the *p53* gene can be:
21. Inherited
22. Sporadic
23. found in approximately 50% of all tumours
24. all of the above
25. Which of the following is not a dietary carcinogen?
26. Polycyclic aromatic hydrocarbons
27. N-nitroso compounds
28. Free carbon donors
29. Heterocyclic amines
30. Place the following atherogenic processes in the order that they appear during plaque formation:
31. Endothelial injury – LDL oxidation- Macrophage infiltration - Smooth muscle cell proliferation-Thrombosis
32. Endothelial injury – Macrophage infiltration - Smooth muscle cell proliferation-LDL oxidation –Thrombosis
33. LDL oxidation– Macrophage infiltration - Smooth muscle cell proliferation- Endothelial injury -Thrombosis
34. LDL oxidation- Macrophage infiltration - Endothelial injury- Smooth muscle cell proliferation-Thrombosis
35. Absence of functional APC protein leads to:
36. Increased cell division
37. Increased DNA damage
38. Increased apoptosis
39. All of the above
40. There is evidence to suggest that different types of N-acetyltransferases (NAT) may affect risk of developing colorectal cancer. According to that evidence, which of the following statements is correct?
41. NAT 1 is linked with a higher risk than NAT2
42. NAT1 is linked with a lower risk than NAT2
43. NAT2 slow is linked with a higher risk than NAT2 fast
44. NAT2 fast is linked with a higher risk than NAT2 slow
45. Which of the following is not a risk factor for developing breast cancer?
46. Age at menarchy
47. Age at first birth
48. Pregnancy weight gain
49. Parity
50. In the diagram below, the question marks refer to
51. Increased FTO expression
52. Decreased FTO expression
53. Increased MC4R activation
54. Decreased MC4R activation



1. Which of the following statements is correct?
2. Adoption studies reveal that adoptees’ weight is more similar to that of the adoptive parents than the biological parents
3. Adoption studies reveal that adoptees’ weight is more similar to that of the biological parents than the adoptive parents
4. Adoption studies reveal that adoptees’ weight does not follow any pattern related to that of the biological or the adoptive parents
5. None of the above
6. Which inheritance pattern does the diagram below show?



1. Autosomal dominant
2. Autosomal recessive
3. X-linked dominant
4. X-linked recessive
5. Which of the following is correct?
6. An oncogene is a modified gene that increases the malignancy of a tumour cell.
7. A proto-oncogene is a normal gene that can become an oncogene
8. Both a and b are correct
9. Neither a nor b are correct

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

1. Provide a detailed overview of polygenic obesity as this is presented through the Genetic Investigation of Anthropometric Traits (GIANT) consortium **(35 marks)**

1. Provide a detailed overview of genetic effects on the carcinogenesis of the colorectum **(20 marks)**. Include descriptions and definitions of proto-oncogenes, oncogenes and tumour suppressor genes in your answer **(15 marks)**.

1. Provide a detailed overview of the association of the *ApoE* gene with cardiovascular disease **(20 marks)**. Include evidence from Genome-Wide Association Studies in your answer **(15 marks)**.

**END OF EXAMINATION**