**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 10th 2020**

Time: **9:30 am – 12:30 pm**

TIME ALLOWED: **THREE** HOURS

Section A:

Answer all questions in this section. There is one correct answer for each question (2 marks each). **Please provide your answers as a list in the booklet, not on this exam paper.**

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. Adoption studies in obesity have shown that:
12. adoptees’ weight is more similar to that of the biological parents than the adoptive parents
13. there is no association between BMI of non-identical twins separated at birth
14. there is a significant relationship between identical twins raised apart
15. all of the above
16. Migration changes the genetic structure by introducing new genes into a population. This phenomenon is called:
17. Mutation
18. Gene flow
19. Evolution
20. Micro-evolution
21. Around 85% of all cases of colorectal cancer are due to:
22. Mutations in the adenomatous polyposis coli (*APC*) gene
23. Mutations in DNA repair genes
24. Mutations in the *p53* gene
25. None of the above
26. Which inheritance pattern does the diagram below show?



1. Autosomal dominant
2. Autosomal recessive
3. X-linked dominant
4. X-linked recessive
5. 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?
6. NAT 1 is linked with a higher risk than NAT2
7. NAT1 is linked with a lower risk than NAT2
8. NAT2 slow is linked with a higher risk than NAT2 fast
9. NAT2 fast is linked with a higher risk than NAT2 slow
10. Which of the following is not a risk factor for developing breast cancer:
11. Age at menarchy
12. Age at first birth
13. Pregnancy weight gain
14. Parity
15. Which of the following is correct?
16. An oncogene is a modified gene that increases the malignancy of a tumour cell.
17. A proto-oncogene is a normal gene that can become an oncogene
18. Both a and b are correct
19. Neither a nor b are correct
20. A disease or condition present among a population at all times is called:
21. an endemic
22. a pandemic
23. a cluster
24. none of the above
25. Which of the following is not a step in the process of atherogenesis?
26. Macrophage accumulation
27. Vascular smooth muscle cell apoptosis
28. Platelet oxidation
29. Monocyte migration
30. BRCA proteins:
31. play an important role in DNA repair mechanisms
32. interact with transcription factors
33. are involved in gene regulation
34. all of the above
35. The most common ApoE allele in Caucasians is:
36. E3/E3
37. E3/E4
38. E2/E3
39. E2/E4
40. The “brain derived neurotrophic factor” gene is associated with:
41. Lower basal metabolic rate
42. Appetite regulation
43. Both a and b
44. Neither a nor b
45. 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:
46. Genetic divergence
47. Genetic drifting
48. Genetic equilibrium
49. Genetic penetrance

Section B:

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

1. Discuss the role and importance of single nucleotide polymorphisms in the *FTO* (20 marks) and *MC4R* (15 marks) genes in relation to weight management.
2. Discuss the increased use of personalisation in medicine. Include biological (25 marks) and non-biological (10 marks) elements of personalisation in your answer. You may use nutrition as an example throughout.
3. Provide a detailed overview of genetic effects on carcinogenesis of the colorectum (20 marks). Include descriptions and definitions of proto-oncogenes, oncogenes and tumour suppressor genes in your answer (15 marks).

**END OF EXAMINATION**