BIOLOGY EXAM QUESTIONS.

1. Cell theory. Comparison characteristics of pro- and eukaryotic cells.
2. Structure of chromosomes. Normal human karyotype. Karyotyping.
3. Nucleic acids. Structure and function. Compare DNA and RNA.
4. Levels of protein structure.
5. Cell organelles. Structure and function of non-membrane organelles.
6. Cell organelles. Structure and function of membrane organelles.
7. Cell cycle. Chromatin structure. DNA replication.
8. Structure of pro- and eukaryotic gene. Introns and exons, regulatory sequences.
9. DNA analyses: PCR, DNA fingerprinting, DNA sequening.
10. Gene expression. Transcription. Regulation of transcription. Posttranscriptional processes.
11. Gene expression. Genetic code. Translation. Folding of a protein.
12. Plant and animal cell differences.
13. Mitosis. Biological importance.
14. Meiosis. Biological importance.
15. Gametogenesis. Spermatogenesis. Ovogenesis. Comparison characteristics of mitosis and meiosis.
16. Comparison characteristics of spermatogenesis and ovogenesis.
17. Mutations. Classification. Clinical examples.
18. Genetic terminology. Genes, alleles, allele- and non-allele genes, heterozygote, homozygote, genotype, phenotype.
19. Mendel's 1^{st} and 2^{nd} laws - principle of uniformity of hybrids and principle of segregation.
20. Multiple allelism. ABO blood group inheritance. Gene pleiotropy.
21. Mendel's 3^{rd} law - principle of independent assortment.
22. Autosomal dominant inheritance. Typical pedigree and examples in human.
23. Autosomal recessive inheritance. Typical pedigree and examples in human.
24. X-linked dominant inheritance. Typical pedigree and examples in human.
25. Y-linked (holandric) inheritance. Typical pedigree and examples in human.
26. X-linked recessive inheritance. Typical pedigree and examples in human.
27. Linkage and recombination of genes in chromosomes. Linkage groups. Gene mapping.
28. Chromosomal theory of inheritance.
29. Interactions of allele genes. Examples in human.
30. Interactions of non-allele genes. Examples in human.
31. Multifactorial inheritance. Variable expression and penetrance of genes. Twin studies.
32. Frequency and etiology of congenital abnormalities.
33. Genetic counseling. Indications for genetic counseling. Prenatal diagnostic

techniques.

34. Population genetics. Hardy-Weinberg law.

35. General characteristics of animal development (ontogenesis).
36. Structure of gametes - egg and sperm. Fertilization.
37. Egg cell structure. Classification of egg cells according to amount and position of yolk.
38. Cleavage. Modes of cleavage. Types of blastula.
39. Gastrulation. Cell movements during gastrulation.
40. Neurulation. Primary embryonic induction.
41. Derivatives of ectoderm, endoderm and mesoderm.
42. Genetic, cellular and integrative mechanisms of development.
43. Anamniotes and Amniotes. Fetal membranes of Amniotes. Formation of extraembryonic membranes in chick and human.
44. Placenta and umbilical cord. Structure and functions.
45. Main abnormalities of fetal membranes in humans. Fetal membrane in twins. Types of twins. Twins – dizygous, monozygons, conjoined.

46. Classification of interspecific interactions. Examples of interspecific interactions.
47. Classification of parasites and hosts.
48. How parasite enters the host. Transmissive invasions. Vectors.
49. Adaptations to parasitism. Examples of parasitic adaptations.
50. Harmful effects of parasites upon the host. Examples.
51. General characteristics of Protozoa. Classification of Protozoa parasitizing human.
52. Lumen - dwelling protozoa. Life cycles of Trichmonas vaginalis, Giardia lamblia, Balantidium coli.
53. Lumen - dwelling protozoa. Life cycles of Entamoeba histolytica. Commensal and opportunistic amoebas.
54. Tissue-dwelling Protozoa. American and African trypanosomiasis.
55. Tissue-dwelling Protozoa. Leishmaniasis. Toxoplasmosis.
56. Malarian parasites. Life cycle of Plasmodium vivax, malariae, falciparum and ovale.
57. General characteristics of Phylum Platyhelminthes. Classification of Platyhelminthes.
58. Brief characteristics of class Trematoda. Morphology of Trematodes. A typical life cycle of Trematodes. Defenitive and intermediate hosts, larval stages, means of invasion.
59. Liver and intestinal flukes. Life cycle of Fasciola hepatica, Dicrocoelium lanceatum, Clonorchis (Opishorchis) spp. and Fasciolopsis buski.

60. Blood flukes. Lung flukes. Life cycles of Schistosoma spp. and Paragonimus westermani.
61. Brief characteristics of class Cestoda. Typical life cycle. Morphology of Cestodes. Adaptations to parasitism in Cestodes.
62. Taenia soleum and Taenia saginata. Life cycle and medical importance. Cysticercosis.
63. Echinococcus granulosus and Alveococcus multilocularis. Life cycle and medical importance.
64. Diphyllobothrium latum. Life cycle and medical importance.
65. Hymenolepis nana. Life cycle and medical importance.
66. Brief characteristics of class Nematoda. Morphology and typical life cycles. Geo- and biohelminthes.
67. Ascaris lumbricoides, life cycle and medical importance.
68. Hookworms. Life cycle and medical importance of Ancylostoma duodenale and Necator amricanus.
69. Enterobius vermicularis and Trichocephalus trichiuris. Life cycle and medical importance.
70. Life cycle of Trichinella spiralis.
71. Dracunculus medinensis. Life cycles and medical importance.
72. Filaria. Life cycles and medical importance of Wuchereria bacrofti, Brugia malaji, Oncohcerca volvulus and Loa loa.
73. Arthropodes. Brief characteristics and classification. Class Arachnida. Morphology and medical importance of Order Aranei and Scorpionida. Venomous spiders and scorpions.
74. Class Arachnida. Order Acari. Ticks and mites. Life cycle of a parasitiformes tick. Morphology and medical importance of Families Ixodidae and Argasidae.
75. Acariformes mites: Demodex folliculorum and Sarcoptes scabiei. Life cycles and medical importance.
76. Brief characteristics of class Insecta. Development with complete or incomplete metamorphosis. Examples.
77. Order Anoplura. Lice. Morphology, life cycle and medical importance.
78. Order Siphonaptera (fleas). Morphology, life cycle and medical importance.
79. Order Diptera. Flies. Role in cause and transmission of human diseases. Myiasis.
80. Order Diptera. Mosquitoes. Life cycle and role in disease transmission.

Each set of exam questions consists of 4 questions from the list above, one photo and one problem from the ‘Manuals to biology classes”.