DEPARTMENT OF ZOOLOGY
MARWARI COLLEGE,RANCHI
SEMESTER VI –PAPER- CC-14

EVOLUTION

Multiple choice questions:

i. The theory of evolution by natural selection was proposed by
   a. Charles Darwin b. Mendel
   c. Morgan d. Lamarck

ii. The origin of species book was written by
   a. Charles Darwin b. Lamarck
   c. Wallace d. Carolus Linnaeus

iii. The theory of spontaneous generation stated that
   a. life arose from living forms only
   b. life can arise from both living and non-living
   c. life can arise from non-living things only.
   d. life arises spontaneously, neither from living nor from the non-living

iv. Palaentological evidences for evolution refer to the:
   a. Development of embryo b. Homologous organs
   c. Fossils d. Analogous organs.

v. Which of the following are the sources which provide evidences for evolution?
   a. Fossils b. Analogous organs
   c. Homologous organs d. All of the above

vi. $(p+q)^2 = P^2 + 2pq + q^2 = 1$ represents an equation used in:
   a. Population genetics b. Mendelian genetics
   c. Biometrics d. Molecular genetics

vii. Fossils are generally found in:
   a. Sedimentary rocks
   b. Igneous rocks
   c. Metamorphic rocks
   d. Any type of rock

viii. Match the scientists listed under column ‘A’ with ideas listed column ‘B’.

Column A	Column B
i. Darwin	M. Neutral theory of molecular evolution
ii. Oparin	N. Use and disuse of organs
iii. Lamarck	O. Abiogenesis
iv. Kimura	P. Evolution by natural selection

a. i-M; ii-P; iii-N; iv-O
b. i-P; ii-M; iii-N; iv-O
c. i-N; ii-P; iii-O; iv-M
d. i-p; ii-O; iii-N; iv-M

ix. Which of the following is not a source of deviation from Hardy-Weinberg equilibrium.
a. Natural selection b. Random mating
c. Gene flow d. Mutation

x. For the MN-blood group system, the frequencies of M and N alleles are 0.6 and 0.4, respectively. The expected frequency of MN-blood group bearing organisms is likely to be
a. 48% b. 44%
c. 9% d. 24%

xi. Type of selection seen in industrial melanism observed in moth, *Biston bitularia*, is*:*
a. Stabilising b. Directional
c. Disruptive d. Artificial

xii. The most accepted line of descent in human evolution is:
a. Australopithecus →Ramapithecus →Homo sapiens →homo habilis
b. Homo erectus →Homo habilis →Homo sapiens
c. Ramapithecus →Homo habilis →Homo erectus →Homo sapiens
d. Australopithecus →Ramapithecus →Homo erectus → Homo habilis →Homo sapiens.

xiii. Which of the following causes variation in genome?
a. Recombination
b. Mutation
c. Random fertilisation
d. All of the above

xiv. Variations caused by mutations are:
a. random and directionless
b. random and directional
c. random and small
d. random, small and directional

xv. Appearance of antibiotic-resistant bacteria is an example of:
   a. adaptive radiation
   b. transduction
   c. pre-existing variation in the population
   d. divergent evolution

xvi. Select the group which shares maximum number of common characters
   a. two individuals of a species
   b. two species of a genus
   c. two genera of a family
   d. two genera of two families

xvii. Formation of new species due to geographical isolation is called
   a. Sympatric speciation
   b. Allopatric speciation
   c. Parapatric speciation
   d. Adaptive radiation

xviii. Individuals of two species preferably breed during different seasons. This type of isolation is called
   a. Habitat isolation
   b. Temporal isolation
   c. Gametic isolation
   d. Mechanical isolation

xix. Which of the following comes under post-zygotic barrier leading to reproductive isolation
   a. Behavioural isolation
   b. Reduced hybrid viability
   c. Mechanical isolation
   d. Both a and c.

xx. The type of selection which acts against both extreme phenotypes and favours intermediate phenotype.
   a. Directional selection
   b. Disruptive selection
   c. Natural selection
   d. Stabilizing selection

xxi. Analogous organs arise due to:
   a. divergent evolution
   b. artificial selection

c. genetic drift
d. convergent evolution

xxii. First genetic material was likely to be:
a. DNA b. RNA
c. Protein d. Lipid

xxiii. Prokaryotic organisms belong to
a. Archaea b. Eukarya
c. Bacteria d. Both a and c

xxiv. According to endosymbiont theory, eukaryotic mitochondria evolved from
a. Photosynthetic, anaerobic prokaryotes
b. Non-photosynthetic, aerobic prokaryotes
c. Both a and b
d. None of the above

xxv. The first vertebrate appeared in which one of the following periods of the Palaeozoic era?
a. Ordovician b. Silurian
c. Devonian d. Mississippian

xxvi. A taxon, all of whose members have the same common ancestor, is
a. Paraphylectic b. Monophylectic
c. Polyphylectic d.None

xxvii. Data from which of the following sources are used for constructing phylogenetic trees
a. Fossils
b. Morphological data
c. Molecular data
d. All of the above

xxviii. "Genetic drift" refers to
a. Gene flow due to migration
b. Changes in gene frequencies due to chance
c. Common ancestry
d. Random mutations

xxix. Darwin's finches are a good example of
a. Industrial melanism
b. Connecting link
c. Adaptive radiation

d. Convergent evolution

xxx. Which mass extinction event resulted in the reduction in the 60% of marine invertebrates?

a. Triassic-Jurassic
b. Late Devonian
c. Ordovician- Silurian
d. Cretaceous-Tertiary

TRUE/FALSE

i. A drastic change in the traits leads to evolution.
ii. Genetic drift is significant in small population.
iii. The outcome of natural selection is random.
iv. The stabilizing selection favours phenotype of intermediate types.
v. Sympatric speciation necessarily involve geographical isolation.
vi. Continental drift promotes allopatric speciation.
vii. Pre-zygotic barriers prevent mating between two individuals of same species.
viii. The fossil position in the layers of earth is not related to its time of extinction
ix. Wings of insects and bats are analogous organs.
x. Inbreeding in a small population reduces heterozygosity.
xi. The Hardy–Weinberg equilibrium does not apply to small populations.
xii. Homologous organs share a common origin.
xiii. Sexual selection leads to sexual dimorphism.
xiv. Asexual reproduction leads to genetic variation.
xv. A clade refers to polyphylectic groups.

Write short notes on the following:

i. Theory of panspermia
ii. Homologous organs
iii. Neutral theory of molecular evolution
iv. Molecular clock
v. Genetic load
vi. Kin selection
vii. Fonder’s effect
viii. Bottleneck phenomenon

ix. Sexual selection
x. Evolutionary forces upsetting Hardy Weinberg equilibrium
xi. Macroevolution
xii. Cline
xiii. Races
xiv. Multiple sequence alignment
xv. Cladogram

At what geological time scale period, the following evolutionary events took place:

i. Evolution of amphibians
ii. Appearance of mammal like reptiles
iii. Dominance of amphibians
iv. Appearance of first reptiles
v. Dominance of dinosaurs
vi. Extinction of dinosaurs
vii. Age of man(Epoch)
viii. Evolution of man(Epoch)
ix. Diversification of fishes
x. Wide expansion of invertebrates

Answer the following questions:

1. What did the theory of spontaneous generation stated? What were the experiments conducted by different scientists that discarded the theory of Abiogenesis?
2. What did the chemical origin of life suggested? What are the various steps involved in this theory?
3. Discuss various experimental evidences that support Biochemical origin of life.
4. What do you mean by Biogeny? What did the biological origin of life theory indicate?
5. What are the prepositions of Lamarckism? Discuss each preposition with the help of examples.
6. Discuss the criticism of Lamarckism. What modifications were done in Lamarckism to propose Neo-Lamarckism?
7. What are the facts and deductions from Darwinism?Discuss with the help of examples.
8. Elaborate various factors responsible for origin of species according to modern synthetic theory (Neo-Darwinism).
9. What is a fossil? What are the different types of fossils found throughout evolution?
10. Discuss the evolution of horse over geological time scale.
11. What are the three domains of life? Differentiate between Archaea- and Eubacteria.
12. Define the term ‘variation’. What are the two main sources of variation?
13. What are heritable variations? Discuss the role of variation in evolution.
14. What does Hardy-Weinberg Law of equilibrium state? Discuss its salient features.
15. Derive Hardy-Weinberg law in a population that has numerical proportion of genes as AA=36%, Aa=48% and aa=16% .
16. What is natural selection? What are the prerequisites of natural selection?
17. Discuss the three types of selection and their salient features.
18. What does the theory of random genetic drift refers to?Discuss its salient features.

19. Define gene pool. What is the role of mutation and migration in operating the gene pool of a population?
20. Discuss the general characters of species. What are the three concept under which species have been described?
21. Define Isolation. Classify the various isolating mechanisms.
22. What are the various premating isolating mechanisms that prevent interspecific crosses?
23. What are the various postmating isolating mechanisms that prevent interspecific crosses?
24. What is speciation? What are the different types of speciation?
25. Define the term 'divergence'. What does the law of adaptive radiation states? Discuss the adaptive radiation in Darwin's finches.
26. What do you mean by Background extinction and mass extinction? Explain with the help of examples. What are the key differences between the two?
27. What does K-T extinction stands for? What were the main causes and final results of this mass extinction?
28. Discuss the phylogeny of primate staring from prehuman ancestor Dryopithecus to *Homo sepians*.
29. What are the key unique hominin characters that are different from that of primate characters?
30. Explain with the help of molecular analysis the close relationship between man and higher apes .
31. What is a phylogenetic tree? Describe the methods for construction of a phylogenetic tree.