



Previous Year Solved Question Paper  
of

**G.A.T.E. (XL) 2013**

**LIFE SCIENCES**

**XL: L Zoology**

**Examination**

*(Original Question Paper with Answer Key)*

**GRADUATE APTITUDE TEST IN ENGINEERING**



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## GATE XL 2013

## L:Zoology

## Q. 1 – Q. 10 carry one mark each.

- Q.1 Which one of the following provides the strongest support for the theory of “descent with modification”?
- (A) Early embryonic forms of diverse organisms (examples: fishes, birds and mammals) appear similar  
(B) Ability of fishes and whales to swim  
(C) Variation in flower colour in a given species  
(D) Skin colour variation among individuals in a human population **A**
- Q.2 Which one of the following is an example of sympatric speciation?
- (A) Origin of new species among wasps that pollinate figs  
(B) Emergence of a new species among finches that migrated to an island and thus isolated from their ancestors  
(C) Evolution of birds’ and bats’ wings  
(D) Speciation of squirrels separated by a wide river **A B C D**
- Q.3 The primary difference between glycogen and cellulose is in the
- (A) types of constituent monosaccharides  
(B) number of monomers per molecule  
(C) configuration of the monomers  
(D) susceptibility to acid hydrolysis **C**
- Q.4 Control mechanisms operate at any of the several steps involved in gene expression. Which one of the following is the key mode of regulation during the cell cycle?
- (A) Transcription  
(B) mRNA processing  
(C) Activation of protein function resulting from protein-protein interaction  
(D) mRNA export **C**
- Q.5 Testicular feminization syndrome is a genetic condition wherein an individual with a XY genotype will have an external female-like phenotype. This is caused by
- (A) Functional loss of androgen receptor  
(B) Increased production of estrogen and its receptor  
(C) Functional loss of Mullerian inhibiting hormone  
(D) Functional loss of androgen receptor and Mullerian inhibiting hormone **A**
- Q.6 Which one of the following defects do you expect to see if you were able to specifically block apoptosis in the developing limb bud of a frog embryo?
- (A) The digits will remain connected through a web-like extension  
(B) The bones will not form, and the limb would look like a paddle  
(C) The limb would look normal but would be larger in size  
(D) The anterior-posterior polarity of the limb will be lost **A**
- Q.7 The formation of antigen-antibody complex helps in disposing antigen through the following pathways EXCEPT:
- (A) Neutralizing the antigen by blocking its activity  
(B) By directly hydrolyzing the antigen  
(C) By promoting the precipitation of antigen  
(D) By activating cell lysis pathway **B**

- Q.8 The term “ecological succession” refers to:
- (A) A process wherein newer species populate a region that was devoid of flora and fauna  
(B) A transition phase wherein one particular set of species is replaced by another set of species  
(C) Changes in the community due to a disturbance in the habitat  
(D) All the above **D**
- Q.9 Which one of the following options provide example for the term “habituation” in behavioral ecology?
- (A) A fish transferred to a fish tank startles initially for a hand clap, but not later  
(B) Migratory birds from the temperate zone migrating towards the tropical part during the winters  
(C) Adult kingfisher birds are more successful in catching fishes than their younger siblings  
(D) Female lizard getting used to a new male lizard during the courtship period **A**
- Q.10 Among the following cell structure-function pairs, identify the correctly paired one
- (A) Microvilli – engulfment of foreign bodies (B) Cytoskeleton – cell migration  
(C) Peroxisomes – cellular respiration (D) Nucleolus – mRNA transcription **B**
- Q. 11 - Q. 20 carry two marks each.**
- Q.11 Which of the following most accurately states the goal of systematics?
- (A) Classification scheme should reflect phylogenetic relationship  
(B) All animals should be classified based on the relatedness at the early embryonic stage  
(C) All animals should be grouped based on DNA sequence data  
(D) Classification of animals should be based on morphological characters **A**
- Q.12 Among the following options, choose the one that is probably a cause of rapid diversification of animal groups during the Cambrian explosion.
- (A) Adaptation of organisms to live in the salty environment of ocean  
(B) Emergence of coelom  
(C) The movement of animals to land  
(D) The accumulation of sufficient atmospheric oxygen to support the metabolism of actively moving animals **D**
- Q.13 A newly discovered, recessively-inherited disease-susceptibility trait (DS) is observed only in cotton plants with white flowers, although the flower colour (R) and DS are independently inherited. In a breeding programme, one variety that is homozygous for the absence of DS, but heterozygous for R was mated to another having white flowers but heterozygous for DS. What is the probability that a given plant among the cross progeny will be susceptible to the disease?
- (A) 25 % (B) 12.5 % (C) 75 % (D) 0 % **D**
- Q.14 In a new species of moth, the genes for body colour (black, *B*, is dominant over grey, *b*), wing size (normal wing, *W*, is dominant over vestigial, *w*) and eye colour (red, *R*, is dominant over white, *r*) are linked. In this species, only one cross-over event has been observed between any two homologous chromosomes during meiosis. In a cross between *BB; ww* and *bb; WW*, 5 % of the progeny were black with normal wings. In a separate cross between *RR; WW* and *rr; ww*, 15 % of the progeny were red-eyed with vestigial wings. In a third cross between *BB; rr* and *bb; RR*, 10 % of the progeny were black-coloured with red eyes. Which among the following is the correct order of these three genetic loci?
- (A) Body colour – Eye colour – Wing size (B) Eye colour – wing size – Body colour  
(C) Wing size – Body colour – Eye colour (D) Eye colour – Body colour – Wing size

**A B C D**

- Q.15 In vertebrates, the variations in the structure and function of nephrons are directly linked to the osmoregulatory requirements of the organisms depending on the habitats they live in. From the options given below, identify the correct combination that truly represents the adaptation seen in desert mammals:
- Long loops of Henle
  - Short loop of Henle
  - Hyperosmotic urine
  - Large volume of urine
  - Removal of nitrogen as uric acid
- (A) Options i and iii    (B) Options ii and iii    (C) Options i and iv    (D) Options i and v    **A**
- Q.16 In *Drosophila*, mutations in homeotic genes result in which one of the following developmental defects?
- (A) The anterior portion of the embryo will not develop  
(B) Several segments in the anterior region of the embryo will be lost  
(C) Segmentation will be lost, and the embryo will have only one segment    **D**  
(D) Segment-specific identities will be lost
- Q.17 Retroviruses, like the influenza virus, escape the detection of pre-existing antibodies in the host by generating surface antigen variants. They do so:
- (A) By editing the surface antigen post-translationally  
(B) Because RNA polymerase of these viruses display high mutation rate during RNA synthesis  
(C) Because the surface antigens are attacked by the proteases present in the host cell  
(D) Because DNA polymerase of the host mutates the viral genome in the infected cell    **B**
- Q.18 The relative number of individuals in each age group is an important demographic factor for the study of future growth trends, and this is normally depicted in the form of an age-structure pyramid. Based on your understanding on population dynamics, match the following distribution properties of age structure (Group 1) with the individual forecast given (Group 2):
- Group 1
- Uniform age distribution in the pyramid
  - Distribution skewed towards younger age groups
  - Distribution skewed towards older age groups
  - Reduction in the number of males in the middle age group
- Group 2
- Emigration in the recent past and the possible increase in the older age groups in the near future.
  - Likely to be a stable population
  - Possible unemployment in the near future
  - Increased government expenditure on medical needs and social security related issues in the near future
- (A) I – iii; II – ii; III – i; IV – iv    (B) I – ii; II – iii; III – iv; IV – i  
(C) I – ii; II – i; III – iii; IV – iv    (D) I – i; II – iii; III – ii; IV – iv    **B**
- Q.19 Like any other trait, animal behavior also evolves by natural selection. Which one of the following examples is NOT true with regard to the evolution of behavior by natural selection?
- (A) The behavioral trait is determined only by genes  
(B) The behavioral trait varies within the population of that species  
(C) The reproductive success partly dependent upon the behavioral trait    **A**  
(D) The behavioral trait is influenced by the genotype

- Q.20 Among the following molecular process-biological effect pairs, identify the mismatched pair.
- (A) Histone deacetylation – activation of gene expression
  - (B) Protein phosphorylation – signal transduction
  - (C) DNA methylation – sex-specific control of gene expression
  - (D) Proteolytic cleavage – activation of signaling by peptide hormones

A

**END OF SECTION - L**

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