

REPUBLIQUE DU CAMEROUN
Paix – Travail – Patrie

MINISTÈRE DES FORETS ET DE LA
FAUNE

SECRETARIAT GENERAL

CELLULE DE L'ENSEIGNEMENT

REPUBLIC OF CAMEROON
Peace – Work – Fatherland

MINISTRY OF FORESTRY AND
WILDLIFE

SECRETARIAT GENERAL

EDUCATION UNIT

**COMPETITIVE ENTRANCE EXAM FOR ADMISSION OF THE 64TH BATCH (2011- 2012)
OF STUDENTS INTO THE NATIONAL FORESTRY SCHOOL, ENEF MBALMAYO.**

CYCLE "B2" : Senior Forestry Technicians (TSEF)

Subject : Natural Sciences
Duration : 3 hours
Coefficient : 5

I DEFINITIONS AND MULTIPLE CHOICE

Part A: Define the words and phrases below / 4 mks

Baroreceptor, bipedalism, thecal gland, saltatory conduction

Part B: (MCQ) Multiple Choice / 4 mks

Each set of statements has one or more correct answers. For each question, write down the number followed by the letter (s) that defines (s) the correct answer.

Performance assessment:

- correct answer = 1mk ; wrong answer = -0.25mk ; no response = 0 pt

-If total points in MCQ is negative, the total score = zero.

1 - There is talk of double fertilization in spermatophytes because:

- a) The two anterotrooids from the pollen tube are involved;
- b) The two nuclei of the pollen grain are involved;
- c) The two nuclei of the embryonic sac are fertilized at the same time
- d) Two zygotes are formed at the end of the process.

2 - The formation of the peptide bond involves:

- a) An amino acid and a monosaccharide;
- b) An amino acid and an enzyme;
- c) An amino acid and a nucleic acid;
- d) An amino acid and a nitrogenous base.

3 - Cone cells are essentially involved in vision:

- a) for low illumination;
- b) For strong illumination;
- c) For nocturnal or crepuscular periods;
- d) at the fovea;
- e) out of the fovea

4 - Living Organisms which are a result of the development of one female gamete are said to be:

- a) Androgenetic e) monogenetic
- b) gynogenetic

- c) pathogenetic;
- d) parthenogenetic;

II Long Responses /8 mks

Duchenne myopathy or muscular dystrophy is a degenerative disease of muscle fibers. In this situation, a certain protein is not synthesized correctly. This is the case of the dystrophy encountered in the membranes of muscle fibers.

A) We know the DNA arrangement corresponding to this gene:
The Figure below gives a portion.

| | |
|------------------------|---|
| Non-transcribed strand | GGT TTG ATT TGG AAT ATA |
| Transcribed strand | <u>CCA</u> <u>AAC</u> <u>TAA</u> <u>ACC</u> <u>TTA</u> <u>TAT</u> |
| | 109 110 111 112 113 114 |

- 1) a) What is a gene? 0.5 mk
- b) list the steps involved in moving from a gene to a protein 0.75 mk
- 2) From a transcribed DNA strand (Figure above), reconstruct the sequence of the corresponding RNA 1mk
- 3) Based on information from the genetic code (above) and the sequence of the RNA obtained in Question 2:
 - a) determine the sequence of the protein synthesized 0.75 pt
 - b) we see that the nucleotide triplet 110 of the mRNA encodes an amino acid different from the normal protein.
 - i) what type of accident is this? 0.5 pt
 - ii) what are the consequences? 0.5 pt

B. 1 - Duchenne muscular dystrophy mainly affects boys and rarely girls. In the few cases where infected men have had children, the boys from "such fathers" were never affected. We know, however, several cases where a woman may have myopathic boys from different fathers.

Given the above information, propose a hypothesis for the location of the gene for the disease. 1pt

Part B:

The pituitary is a gland located at the ventral surface of the brain. Its removal (hypophysectomy) performed on 20 rats causes a regression of the size of each testicle, stops sperm production and secretion of testosterone.

Ten (10) hypophysectomized rats were injected with a small amount of pituitary extracts for a month after which the testes and seminal vesicles of rats attained their original size and resumed the production of sperm and testosterone.

1 - From this information, establish relationships between the pituitary and testicular functions. 1.5pt

2 - Prostate cancer is related to plasma testosterone concentration. To overcome this disease, we now know that surgical castration of the sick man is necessary, but castration may be avoided by using certain molecules such as cyproterone acetate, which suppresses the secretion of testosterone and the regression of the tumor.

Given the above, list two types of target cells of the body on which could act the molecules of cyproterone acetate. 0.75 x 2 = 1.5mks