NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCES

DEPARTMENT OF APPLIED BIOLOGY AND BIOCHEMISTRY

BACHELOR OF SCIENCE HONOURS DEGREE IN APPLIED BIOLOGY AND BIOCHEMISTRY

ADVANCED BIOCHEMISTRY AND MOLECULAR PHYSIOLOGY SBB 4101

EXAMINATION PAPER

DECEMBER 2017

This examination paper consists of 2 pages

Time Allowed: **3 hours**

Total Marks: **100**

Special Requirements: **None**

INSTRUCTIONS TO CANDIDATES

1. **Answer Four (4) Questions. Each question carries 25 marks.**
2. **Where a question contains subdivisions, the mark value for each subdivision is given in brackets.**
3. **Illustrate your answer where appropriate with large, clearly labelled diagrams.**

1. Critically review the role of free radicals and oxidative stress in the genesis and pathophysiology of aging, neurodegenerative disorders and cancer.

2.(a) Outline the core components of the canonical Notch signalling pathway and briefly describe the unique properties of this signalling. (15 marks)

(b) Briefly describe the general structure, ligand-induced activation and the recruitment of associated signal-transduction proteins of receptor protein tyrosine kinases (RTKs). (10 marks)

3. (a) Give a detailed account of the ubiquitin-mediated proteolytic pathway, highlighting pathological manifestations associated with aberrations in this pathway. (15 marks)

(b) Describe key steps and molecular interactions involved in the biochemistry of muscle contraction. (10 marks)

4. (a) Describe biochemical manifestations and sequelae of chronic insulin-dependent diabetes mellitus. (18 marks)

(b) Outline unique metabolic pathways that could serve as new potential targets for therapeutic intervention in obligate intracellular parasites such as *Taxoplasm gondii*, *Plasmodium* and *Cryptosporidium* spp. (7 marks)

5. (a) Briefly describe and state the importance of coordinated activation of pancreatic digestive zymogens. (5 marks)

(b) Compare and contrast the active site structures and mechanisms of action of two named metalloenzymes. (20 marks)

6. (a) Discuss the transportation to target cells and mode of action of steroid hormones. (10 marks)

(b) Give an account of secondary hemostasis. (15 marks)

END OF EXAMINATION PAPER