



NATIONAL OPEN UNIVERSITY OF NIGERIA

University Village, Nnamdi Azikiwe Expressway, Plot 91, Cadastral Zone, Jabi, Abuja

Faculty of Agricultural Sciences

2024 1 EXAMINATION

Course Title: Introduction to Animal Products Processing and Preservation

Course Code: ANP 303.

Credit Unit: 2

Total Score: 70 Marks

Time Allowed: 2Hours

INSTRUCTION:

Answer Compulsory question 1 (30 marks) and any 2 questions (20 marks each)

Question one

- a) As an animal science student explain to a farmer how animal products are classified generally (12 marks)
- b) Animals have started growing before being born, mention five (5) attributes of this type of growth (5 marks)
- c) How is an egg formed from ovulation to laying (7 marks)
- d) Why is milk considered the most complete food to sustain life and nutritionally valuable? (2 marks)
- e) Differentiate between Pasteurization and Sterilization of meat (4 marks)

Question two

- a) With relevant examples outline five (5) uses of external by-products of the animal (5 marks)
- b) Describe government involvement in the milk industry of Nigeria (5 marks)
- c) Explain the involvement of transhumance pastoralists in the milk industry of Nigeria (10 marks)

Question three

- a) A sheep was brought to you to assess the maturity, as an animal science student what are the useful indicators you will use to do this. (9 marks)
- b) State the basic principle behind drying as a preservative method (2 marks)
- c) Give the meaning of smoking and describe the effects of smoke on meat (9 marks)

Question four

- a) Fresh milk hardly carries any smell however, there are several factors which may produce off-flavours and odours, discuss these factors. (7 marks)
- b) With the aid of a diagram show the reproductive system of chicken hen (8 marks)
- c) What are some of the external and internal factors that can be used for egg assessment (5 marks)

- a. Write the general form of Tafel equation and split it to cathodic and anodic components. Define all the terms in the equation (8 marks)
- b. Calculate the Tafel constant for the anodic polarization when $\alpha = 0.7$, temperature = 300 K, $R = 8.314 \text{ J/K}$, $n = 2$ and $F = 9500 \text{ C}$ (7 marks)
- (c) State the two types of polarization and the major difference between them. Also, present an equation for expected total polarization (5 marks)

Question 4

20 marks

- a(i) State the Kohlrausch law and give its mathematical expression of the law (4 marks)
- ii. Define the term Activity coefficient (4 marks)
- b. Consider a 1:1 electrolyte consisting of a cation, A^+ and an anion, A^- where the Gibb function of these ions can be written as follows, $G_{A^+} = G_{A^+}^0 + RT \ln a_{A^+}$ and $G_{A^-} = G_{A^-}^0 + RT \ln a_{A^-}$, prove that the mean activity coefficient can be written as $\gamma_{\pm} = (\gamma_+^x \gamma_-^y)^{\frac{1}{x+y}}$. (9 marks)
- c. Highlight two applications of conductivity titration. (3 marks)

Question 5

- (a) Write the general form of the Ilkovic equation. Hence, given the following values for a dropping mercury electrode, calculate the diffusion current using the Ilkovic parameters $n = 2$, $D = 4.0$, $t = 64 \text{ s}$, $m = 8$ and $C = 2.3 \text{ M}$ (all in S.I unit). (7 marks)
- b. Write all possible electrochemical reactions that are possible in the hydrogen fuel cell and draw a block diagram of the cell (10 marks)
- c. Highlight causes of the three types of mass transport in an electrochemical cell (3 marks)