ELIZADE UNIVERSITY
FACULTY OF BASIC AND APPLIED SCIENCES
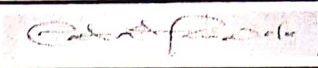DEPARTMENT: PHYSICAL AND CHEMICAL SCIENCES
PROGRAMME: APPLIED GEOPHYSICS   EXAM TITLE: DEGREE EXAMINATION
COURSE CODE & TITLE: AGP 206 – Introductory Geomathematics
TIME ALLOWED: 2 Hours, 30 Minutes   SEMESTER/SESSION: 2nd / 2018/2019
INSTRUCTIONS: Write your matriculation number on the cover page of the exam. booklet.

Answer <u>any three</u> questions

HOD's SIGNATURE

1. (a) (i) Differentiate from first principle $f(x) = x^2$ and determine the value of the gradient of the curve at $x = 2$ (ii) If $f(x) = 2x^5 - 4x^3 + 3x - 5$, find $f''(x)$.

    (b) Given that $f(x) = 5x^2 + x - 7$.

    Determine: (i) $f(2) \div f(1)$ (ii) $f(3 + a)$ (iii) $f(3 + a) - f(3)$ (iv) $\frac{f(3+a)-f(3)}{a}$

                                                                        (20 marks)

2. (a) Given $\begin{pmatrix} 3 & 4 & -1 \\ 2 & 0 & 7 \\ 1 & -3 & -2 \end{pmatrix}$ evaluate the determinant by using (i) the third column expansion (ii) the second row expansion.

    (b) In an experiment to determine the relationship between force on a wire and the resulting extension, the data given below were obtained. (i) Use the product moment formula to determine the linear coefficient of correlation for this data (ii) State the significance of the value.

Force (N)	10	20	30	40	50	60	70
Extension (mm)	0.22	0.40	0.61	0.85	1.20	1.45	1.70

                                                                        (20 marks)

3. (a) Sketch the following mathematical functions:

    (i) $f(x) \begin{cases} 4 & 0 < x < 5 \\ 0 & 5 < x < 8 \end{cases}$;   (ii) $f(x) \begin{cases} -1 & 0 < x < 2 \\ 3 & 2 < x < 5 \\ -1 & 5 < x < 9 \end{cases}$

    $f(x + 8) = f(x)$ $f(x + 9) = f(x)$

    (b) A force of 4N is inclined at an angle of 45° to a second force of 7N, both forces acting at a point. (i) Find the magnitude of the resultant of these two forces (ii) Resolve the direction of the resultant with respect to the 7N force.

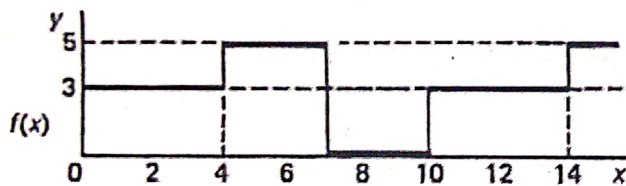   (20 marks)

4.   (a) In an experiment to determine the relationship between frequency and the inductive reactance of an electrical circuit, the following results were obtained:
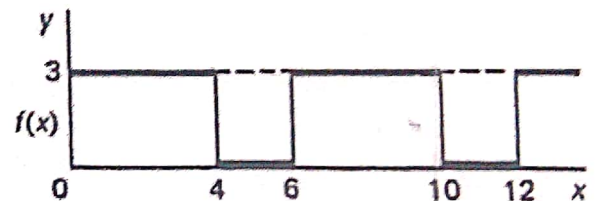
Frequency (Hz)	50	100	150	200	250	300	350
Inductive reactance (ohms)	30	65	90	130	150	190	200

(i) Determine the equation of the regression line of inductive reactance on frequency, assuming a linear relationship (ii) Use the regression equation calculated to find the value of inductive reactance when frequency is 175 Hz.

(b)   Define analytically the periodic functions shown below:

(i)

(ii)

(20 marks)