

ELIZADE UNIVERSITY

ILARA-MOKIN

ONDO STATE

FACULTY: Basic and Applied Sciences
DEPARTMENT: Physical and Chemical Sciences
FIRST SEMESTER EXAMINATIONS
2016/2017 ACADEMIC SESSION

COURSE CODE: AGP 419

COURSE TITLE: GEOPHYSICAL TIME SERIES ANALYSIS

DURATION: 2 1/2 Hours

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HOD's SIGNATURE

TOTAL MARKS: 60 MARKS

Matriculation Number: _____

INSTRUCTIONS:

1. Write your matriculation number in the space provided above and also on the cover page of the exam booklet.
2. This question paper consists of 2 pages including the cover page.
3. Attempt Questions 1 and 4, and any other two questions.

1. (a) Show by means of illustrations the effect of sampling interval on the reconstruction of an analog signal. List other conditions that could cause incorrect reconstruction.
- (b) For a set of signals with inputs 100 Hz, 200 Hz, 250 Hz and 300 Hz sampled at 2 msec, 4 msec and 8 msec. Determine for each input (i) Output (ii) Maximum recoverable frequency and (iii) Alias
- (c) Write briefly on the following:
 - (i) Nyquist Frequency (ii) Dynamic Range (iii) Amplitude spectrum

22 Marks

2. (a) Given the wavelets (1, -1, 1, -1) (1, 1, 1, 1) and (1, 2, 3, 4), find the autocorrelation of each wavelet and the cross - correlation of each pair of wavelets.
- (b) Determine the Fourier series for a periodic function

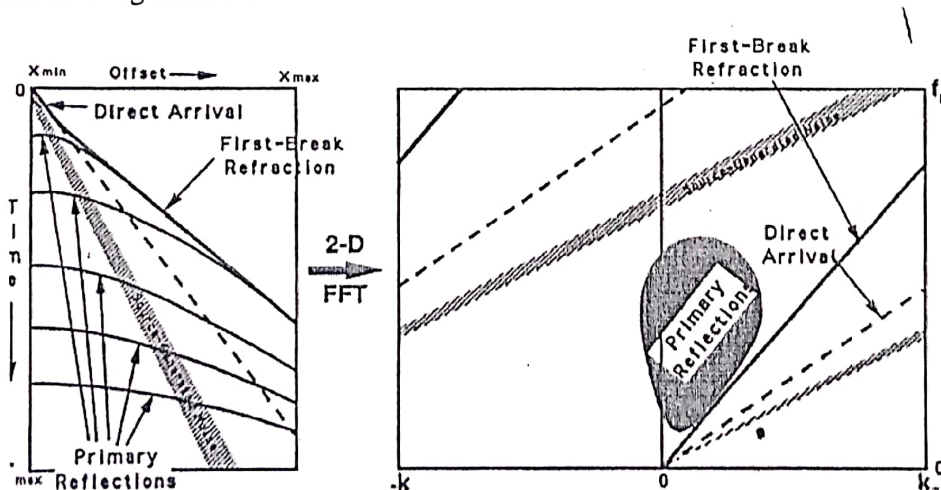
$$f(x) = \begin{cases} -1 & -\pi < x < 0 \\ +1 & 0 < x < \pi \end{cases}$$

18 Marks

3. (a) Consider a filter with impulse response (2, -1, 1, 3, -2), evaluate the system using geometric operation of sliding assuming input (1, -1). Use graph to explain the operation.
- (b) Describe the effect of time shift on the phase and symmetry of a typical wavelet.

18 Marks

4. (a) Explain using (i) Mathematical Concept (ii) Diagram the term "Fourier Transform"
- (b) The figure below is a T-X and F-K plane. Describe how this figure explains the discrimination between signal and noise.



20 Marks

5. (a) The earth is a filter. Explain using diagram(s).
- (b) Using z - Transform, finds the following convolution: (-6, 5) * (3, -2, 1) and (4, 3, 2, 1) * (2, -1)

18 Marks