



FACULTY OF ENGINEERING AND THE ENVIRONMENT

**BACHELOR OF SCIENCE (HONORS) DEGREE IN GEOMATICS AND
SURVEYING**

HYDROGRAPHIC SURVEYING

MODULE CODE: ESG 3111

EXAMINATIONS JUNE 2025

DURATION: 3 HOURS

EXAMINER: T.T. MAKONI

INSTRUCTIONS

1. ANSWER **ALL** QUESTIONS

1			INTRODUCTION TO HYDROGRAPHIC SURVEYING (TOTAL 25 MARKS)	
	a)		What are the different operations conducted in hydrographic surveying?	4
	b)	(i)	Name and briefly explain four characteristics that hydrographic surveying is used to determine?	8
		(ii)	What are the three objectives of hydrographic surveying?	3
	c)	(i)	How can inaccuracies in hydrographic surveys lead to real-world consequences in maritime navigation? Provide examples of incidents where poor survey data contributed to accidents.	6
		(ii)	One of the objectives of hydrographic surveying is to determine the direction of current, explain this procedure?	5
2			HYDROGRAPHIC SURVEYING EQUIPMENT (TOTAL 25 MARKS)	
	a)		Analyze the role of GPS and GNSS in improving the accuracy of hydrographic surveys.	6
	b)	(i)	Explain the principle of echosounding and discuss how it differs from other underwater measurement techniques.	7
		(ii)	What are the underlying physical principles that make echosounding effective?	4
		(iii)	With the support of well-annotated diagrams, compare and contrast single-beam and multibeam echosounders.	8
3			DATA COLLECTION TECHNIQUES (TOTAL 25 MARKS)	
	a)		Analyze the advantages and disadvantages of using LIDAR for hydrographic surveys in shallow waters compared to sonar methods.	6
	b)	(i)	Describe and explain any two methods used for calibrating an echosounder.	6
		(ii)	How can noise reduction techniques enhance the quality of data collected from echosounders?	5

	c)		Your survey site experiences strong tidal currents. What adjustments would you make to your data collection methods to mitigate the impact of these currents on accuracy?	8
4			TIDES (TOTAL 25 MARKS)	
	a)		Distinguish what causes high and low tides?	4
	b)		With the aid of a diagram, what are the main sources related to the formation of tides.	6
	c)		Discuss the implications of tidal currents on survey vessel positioning and data collection accuracy.	8
	d)	(i)	What are the causes of neap tides?	2
		(ii)	What are the characteristics of neap tides?	3

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