

Ministry of Education

Test Blueprint for National Exit Examination to be held in 2015 E.C

Program: - Bachelor of Science Degree in Geomatics Engineering

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1. Introduction

The Ministry of Education of Ethiopia has announced the implementation of exit exam for all undergraduate program students (public and private), beginning with the 2022/2023 academic year, in order to improve the quality of graduates produced by higher learning institutions. The exit exam aimed at checking whether students have acquired the required knowledge, skills and attitudes or not. To implement this, it requires determining competency areas for a specific program, which is already completed. Based on the competency areas prepared, it needs to plan the construction of tests.

Planning of a test is a first and vital step in the construction of an achievement test. An achievement test demands very systematic and careful planning, as a fact that good planning is a symbol of success. Tests are the tools that provide scores that measure level of student learning and study program learning outcomes. In order to achieve the valid and reliable measurement of student learning and program learning outcomes, the development of valid and reliable test is the mandatory. Test should be able to measure student performance in all dimensions of knowledge, skill and attitude. The carefully planned test construction contributes to improve the overall quality of the test in terms of test content validity, difficulty level, discrimination power and test reliability. Test preparation is not an easy task; it requires a careful planning and guideline to make the task simple. Test construction needs the preparation of test blue print. Test blueprint is defined as a complete plan that explains how to develop a test. The term refers to a map or specification of assessment to ensure that all aspects of the curriculum and educational domains are covered by the assessment programs over a specified period of time. It helps curriculum developers/test constructors

to match various competencies with the course content and the appropriate modality of assessment.

Generally, test blueprint will help to ensure tests: 1) Appropriately assess the achievement of instructional objectives of the course; 2) Appropriately reflect key course goals, objectives and the material learned or covered during the instruction period; and 3) Include the appropriate item formats along with the knowledge and skills being assessed.

Keeping this in mind, the team has prepared this test blueprint document in order to help the test developers or content specialists in their process of valid and reliable test construction. The major points considered in the process of preparing this test blue print guideline were the core competencies that have been already identified for the themes of courses, the course contents, course credit hours, and the learning outcomes with their corresponding levels of achievement by learning domains. In line with these, the number of test items that should adequately assess the performance of students in all the content topics will be determined through discussion with the content specialists who construct the blueprint and test for their corresponding study program.

Therefore, the main purpose of this manual is to give direction on how to develop blueprint for content specialists so that they can develop a test blueprint for their respective program.

2. Objective of test blueprint

Test blueprint preparation is generally opted to assist the preparation of a test that is representative, broadly sampled, and consisting of complete knowledge domain expected of the Ethiopian higher education students on completion of their study program. The specific objectives of test blueprint are to:

- Facilitate the construction of a representative and balanced test items for the selected courses in accordance with the competencies identified.
- Guide test developers or writers to write or set appropriate test items.

3. Learning Goals and Learning Outcomes from Geomatics Engineering Courses

Themes	Course	Competencies	Learning Outcomes
Basic of Surveying	Introduction to Surveying	explain the basic concepts of surveying, describe branches and application of surveying explain basic surveying instruments, units of measurements , Scales , precision, accuracy, Errors and mistakes, corrections, angles and vertical distance measurement, direction, traversing explain basic measurement in surveying	❖ Explain the basic concepts of surveying, branches and its applications ❖ Describe units of measurements, precision and accuracy. ❖ Students will be able to describe basic measurement in surveying , ❖ compute angles and direction of line ❖ Compute traversing and its corrections ❖ Students will be able to calculate tape correction ❖ Computation traversing.
	Construction surveying	The student understands the principle of setting out of all civil works like highway, building, irrigation	❖ The student has understood the concept of construction surveying, ❖ Type of construction projects, ❖ elements of project control survey, ❖ Introduction to field note management, ❖ Different points on note keeping, ❖ types of field book, ❖ arrangement of field notes of surveying data ❖ Instrument for uses for construction survey (tape, level, staff rod, ranging pole, profile board, theodolite, total station etc.) ❖ The student understand different Setting out works procedure and elements (i.e., Setting out of buildings, sewers, drains, pipe lines, bridges, tunnels, canals and other engineering structures)

GIS and Cartography	Introduction to Cartography	Students will be able to design and compile different purpose maps	❖ Students will be able to explain the basic Basic definition Nature and scope of Cartography ❖ Students will be able to clarify Cartographic abstraction and generalization ❖ Students will be able to explain the Classification and principle of map design mathematics of map projection, Classification of map projections; Projection properties ❖ Students will be able to explain mathematics of map projection, Classification of map projections and Projection properties ❖ Students will be able to describe Choice and identification of map projection
	Digital Cartography	Up on successful completion of the course, students will be able to project and compile maps using recommended software programs.	❖ The student understands the overview of the historical development digital cartography. ❖ Understand the concept of mapping natural and socio-economic data using computers; ❖ Qualitative method of mapping with the use of computers; ❖ Understand different techniques of designing thematic maps and processing and thematic data; ❖ Clarify different hardware and software requirements in digital cartography; ❖ basics and principles of desktop mapping; ❖ understand the uses and application of map elements (DOGSTAILS); ❖ Process of displaying geodatabase compilation, edition and reproduction of maps using computers
	Topographic Surveying	Students will be able to produce a topographic map of an area tied into a closed traverse, using stadia, total station and Software by	❖ Methods for Topographic Surveying; ❖ Horizontal and vertical control on topographic survey ❖ Methods of representing topography ❖ Understand the basic map elements;

		recording physical features such as: structures, utilities, land forms, water boundaries, vegetation, etc.	❖ Stadia notes to develop topographic and planimetric maps; ❖ Procedure of gathering field data through the use of the Total Station ❖ Understand different methods to analyzing and processing the data using soft wares; ❖ Office plotting; Mapping accuracy; ❖ Understand the compilation of topographic map;
	Geographical Information System (GIS	The students will be able to explore fundamental principles of Geographic Information Systems (GIS) and its applications including hardware and software	❖ Definition of GIS and related Terminology, ❖ Element of GIS, ❖ Understand the major application areas of GIS. ❖ Geographic Data Model (GIS Data, GIS Data Source, GIS Data Model, Vector Spatial Data Model, Raster Spatial Data Model) ❖ Hard ware and Software required for GIS ❖ Database Management System (DBMS) and Geodatabase. ❖ Data Input, Spatial data input technique, ❖ Understand Vector and Raster based spatial data analysis. ❖ Acquisition of digital Terrain model, ❖ Understand the concept of data Processing, Analysis and Visualization, ❖ Understand application of digital Terrain Model ❖ The concept of planning GIS Project.
	Geographical Information System (GIS) II	students will be able to provide an understanding of spatial analysis, techniques, available within GIS environment	❖ Understand point process and network analysis. ❖ Operation of Advanced surface operations (interpolation, line of sight, volume calculation, drainage, contour line mapping)
	Spatial Database Management System	Student understand the concept of explain spatial data organization structures at various spatial scales; create conceptual models of data using top down and bottom up approaches; translate conceptual models to logical	❖ Introduction to Spatial Databases, ❖ Differentiate between Databases versus database management systems, ❖ Database management system architecture, ❖ Database design approaches ❖ Discuss on process of ER modeling (Relational model, Geo-relational model, Object model, Object-relational model)

		and physical data models using GIS database software;	❖ The concept of Data query, ❖ Data models for spatial and non-spatial data, ❖ Discuss on creation of Geodatabases model ❖ utilize geo-relational and object-related databases with a GIS (ArcGIS or current equivalent ❖ Design and create geo-relational and object-relational databases to meet spatial project requirements.
	Cadastral Surveying	Understand the concept of cadastral survey and property registration	❖ The student to understand the concept of Cadastral systems, ❖ Discuss types of cadasters, ❖ understand the roles of cadaster, ❖ property registration, cadaster data contents and standards, ❖ Cadastral data models, boundary analysis. ❖ The concept of land, property ownership and conveyance
Remote Sensing and Photogrammetry	Introduction to Remote Sensing	Students will be able to Understand the concepts of remote sensing and handle the image processing Understand the advantage of remote sensing in different application	❖ Students will be able to describe Concepts of Remote Sensing ❖ Students will be able to describe fundamental principles of remote sensing as they relate to engineering and environmental problems ❖ Students will be able to describe Remote sensing satellites, Platforms and sensors ❖ Students will be able to understand image classification
	Digital Image Analysis	students will be able to have working knowledge of sophisticated methods and techniques for collecting, processing and analysing remotely sensed data; as well as the theory and practice of undertaking remote sensing projects	❖ Students will be able to describe Digital image processing, (pre-processing, Image Enhancement, image transformation, ❖ Students will be able to describe the method of digital Image Classification and Analysis ❖ Students will be able to Understand remote sensing and GIS data integration, and applications of remote sensing in geographical analysis and environmental monitoring

	Introduction to Photogrammetry	Students will be able to read, interpret and use aerial photographs for various purposes, particularly for plotting topographic maps and measurements	❖ Students will be able to describe role of photogrammetry in surveying and mapping ❖ Students will be able to Understand the historical developments of photogrammetry, useful organizations and journals ❖ Students will be able to know Principles of Photography & Imaging ❖ Know the classes and types of cameras ❖ Be able to identify the cameras component parts and their functions. ❖ Understand basic optical phenomenon in photogrammetry ❖ Know concepts of calibration ❖ Students will be able to describe Geometry of Aerial Photograph ❖ Recognize the basics of vision theory; stereoscopes; the theory of parallax and use of parallax equations in solving simple photogrammetric problems. ❖ Understand the basic elements of overlap, side lap and the effects of scale variation ❖ Students will be able to interpret air photo for plotting large and medium scale topographic map
	Analytical Photogrammetry	Students will be able to the concepts of analytical photogrammetric principles	❖ Understand Image measurement & Corrections to photo coordinates: interior orientation, film deformation, lens distortion, atmospheric refraction, earth curvature ❖ Students will be able to describe principles of analytical photogrammetric ❖ Students will be able to understand Principles of aerial triangulation, concepts of the bundle adjustment, ❖ Students will be able to describe Principles of airborne GPS triangulation and direct sensor ❖ Students will be able to describe Photographic Coordinate Systems ❖ Students will be able to describe Image measurement & Corrections to photo coordinates
	Introduction to Geodesy	Students will be able to calculate Two dimensional control surveying	❖ Students will be able to describe the principles of Two dimensional control surveying

Geodesy		Identify strengths and weaknesses of different map projection coordinate systems Perform forward and inverse computations in zones using the transverse Mercator map projection	❖ Students will be able to describe concept of horizontal control surveying ❖ Students will be able to describe methods used to establish horizontal control surveying ❖ Students will be able to compute distance, direction of line Two dimensional control surveying(traverse, triangulation, intersection) by using coordinate ❖ Students will be able to describe the principles of vertical control surveying ❖ Students will be able to provide elevations of fixed benchmarks with respect to the mean sea level
	Advanced Geodesy	Students will be able to Explain the concept of physical geodesy, gravity measurements, reduce gravity observation and Explain coordinate transformation parameters.	❖ Students will be able to describe physical geodesy, ❖ Students will be able to describe physical geodesy problems, ❖ Students will be able to describe gravity anomaly, ❖ Students will be able to describe gravimeter, ❖ Students will be able to describe gravity observations
	Theory of Errors and Adjustment Computations	Students will be able to understand the basic statistical concepts related to small data sets Students will be able to identify random error theory including the normal distribution, standard normal distribution, identify random error sources and propagation Students will be able to Identify propagation of random errors in indirectly measured	❖ Students will be able to describe random error theory, ❖ Students will be able to describe propagation of random errors in indirect measured quantities, , Students will be able to describe weight of observation, ❖ Students will be able to describe principles of least squares,

		quantities	
	Global Positioning System (GPS)	explain the differences between planar, spherical, ellipsoidal and geodetic surfaces in surveying discuss the source of GPS data and the satellite coverage required for XYZ measurements identify sources of errors in satellite survey data input convert latitude and readings to northing and easting distances on a spherical surface	❖ Understand the definition and basic principle of GNSS ❖ GNSS Satellite Generation ❖ Understand GPS Errors and Biases ❖ Know Carryout static or kinematics measurements within a given site. ❖ Mark control points within the required distance through the given area ❖ Understand major GNSS satellite components ❖ Know GPS Time System ❖ Understand GPS Measurement mode
Transportation and Highway Engineering	Transportation Planning	Understand the fundamentals of urban transportation planning and the types of skills and knowledge that transportation planners need and application of the results of the forecasting to identify the right type of the transportation system needed to cater to the future demand and quantify the same.	❖ This course provides an in-depth exploration of various components of the urban transportation planning process, with emphasis on theories on modeling. ❖ The principle behind the conventional four-stage transport planning model (namely, trip generation, trip distribution, modal split and trip assignment) ❖ Understand the economic role of transportation in urban areas, ❖ land-use impacts of transportation projects, ❖ Elements of Traffic Indicators. ❖ Road Infrastructure supply (road marking, road sign, traffic signal, parking facilities) ❖ Traffic system performance ❖ Traffic safety elements. ❖ The role of transportation within the global climate change.
	Highway	Students will also be able to	❖ Understand the importance of transportation,

	Engineering-I	understand the elements on selection of new route develop and apply concepts of geometric design for rural and urban roads and highways.	❖ Transportation systems, ❖ The course helps the student to understand on selection of the route highway based on the requirements like Short Easy safe Economical. ❖ Understand the components of road structures, ❖ different highway classification ❖ Types of roads structures ❖ Understand factors governing geometric design, ❖ Computation of sight distance, ❖ Elements of Horizontal alignment ❖ Elements of vertical alignment ❖ Understand the computation of earth work. ❖ Understand the concept of traffic Engineering concept

4. List of learning out come

Introduction to Surveying

LO1. Explain the basic concepts of surveying, branches and its applications
LO2. Describe units of measurements, precision and accuracy.
LO3. Students will be able to describe basic measurement in surveying ,
LO4. compute angles and direction of line
LO5. Compute traversing and its corrections
LO6. Students will be able to calculate tape correction
LO7. Computation traversing.

Construction surveying

LO8. The student has understood the concept of construction surveying,
LO9. Type of construction projects,
LO10. Elements of project control survey,
LO11. Introduction to field note management,
LO12. Different points on note keeping,
LO13. Types of field book, arrangement of field notes of surveying data
LO14. Instrument for uses for construction survey (tape, level, staff rod, ranging pole, profile board, theodolite, total station etc.)
LO15. The student understand different Setting out works procedure and elements (i.e., Setting out of buildings, sewers, drains, pipe lines, bridges, tunnels, canals and other engineering structures)

Introduction Cartography

LO16. Students will be able to explain the basic Basic definition Nature and scope of Cartography
LO17. Students will be able to clarify Cartographic abstraction and generalization
LO18. Students will be able to explain the Classification and principle of map design mathematics of map projection, Classification of map projections; Projection properties
LO19. Students will be able to explain mathematics of map projection, Classification of map projections and Projection properties
LO20. Students will be able to describe Choice and identification of map projection

Digital Cartography

LO21. The student understands the overview of the historical development digital cartography.

LO22. Understand the concept of mapping natural and socio-economic data using computers;

LO23. Qualitative method of mapping with the use of computers;

LO24. Understand different techniques of designing thematic maps and processing and thematic data;

LO25. Clarify different hardware and software requirements in digital cartography;

LO26. basics and principles of desktop mapping;

LO27. understand the uses and application of map elements (DOGSTAILS);

LO28. Process of displaying geodatabase compilation, edition and reproduction of maps using computers

Topographic Surveying

LO29. Methods for Topographic Surveying;
LO30. Horizontal and vertical control on topographic survey
LO31. Methods of representing topography
LO32. Understand the basic map elements;
LO33. Stadia notes to develop topographic and planimetric maps;
LO34. Procedure of gathering field data through the use of the Total Station
LO35. Understand different methods to analyzing and processing the data using soft wares;
LO36. Office plotting; Mapping accuracy; Understand the compilation of topographic map

Geographical Information System (GIS) I

LO37. Definition of GIS and related Terminology,
LO38. Element of GIS,
LO39. Understand the major application areas of GIS.
LO40. Geographic Data Model (GIS Data, GIS Data Source, GIS Data Model, Vector Spatial Data Model, Raster Spatial Data Model)
LO41. Hard ware and Software required for GIS
LO42. Database Management System (DBMS) and Geodatabase.
LO43. Data Input, Spatial data input technique,
LO44. Understand Vector and Raster based spatial data analysis.
LO45. Acquisition of digital Terrain model,
LO46. Understand the concept of data Processing, Analysis and Visualization,
LO47. Understand application of digital Terrain Model
LO48. The concept of planning GIS Project.

Geographical Information System (GIS) II

LO49. Understand point process and network analysis.
LO50. Operation of Advanced surface operations (interpolation, line of sight, volume calculation, drainage, contour line mapping)

Spatial Database Management System

LO51. Introduction to Spatial Databases,
LO52. Differentiate between Databases versus database management systems,
LO53. Database management system architecture,
LO54. Database design approaches
LO55. Discuss on process of ER modeling (Relational model, Geo-relational model, Object model, Object-relational model)
LO56. The concept of Data query,

LO57. Data models for spatial and non-spatial data,
LO58. Discuss on creation of Geodatabases model
LO59. utilize geo-relational and object-related databases with a GIS (ArcGIS or current equivalent); and
LO60. Design and create geo-relational and object-relational databases to meet spatial project requirements.

Cadastral Surveying

LO61. The student to understand the concept of Cadastral systems,
LO62. Discuss types of cadasters,
LO63. understand the roles of cadaster,
LO64. property registration, cadaster data contents and standards,
LO65. Cadastral data models, boundary analysis.
LO66. The concept of land, property ownership and conveyance

Introduction Remote Sensing

LO67. Students will be able to describe Concepts of Remote Sensing
LO68. Students will be able to describe fundamental principles of remote sensing as they relate to engineering and environmental problems
LO69. Students will be able to describe Remote sensing satellites, Platforms and sensors
LO70. Students will be able to understand image classification

Digital image Image Analysis

LO71. Students will be able to describe Digital image processing, (pre-processing, Image Enhancement, image transformation,
LO72. Students will be able to describe the method of digital Image Classification and Analysis
LO73. Students will be able to Understand remote sensing and GIS data integration, and applications of remote sensing in geographical analysis and environmental monitoring

Introduction Photogrammetry

LO74. Students will be able to describe role of photogrammetry in surveying and mapping
LO75. Students will be able to Understand the historical developments of photogrammetry, useful organizations and journals
LO76. Students will be able to know Principles of Photography & Imaging
LO77. Know the classes and types of cameras
LO78. Be able to identify the cameras component parts and their functions.
LO79. Understand basic optical phenomenon in photogrammetry
LO80. Know concepts of calibration
LO81. Students will be able to describe Geometry of Aerial Photograph
LO82. Recognize the basics of vision theory; stereoscopes; the theory of parallax and use of parallax equations in solving simple photogrammetric problems.
LO83. Understand the basic elements of overlap, side lap and the effects of scale variation
LO84. Students will be able to interpret air photo for plotting large and medium scale
topographic map

Analytical Photogrammetry

LO85. Understand Image measurement & Corrections to photo coordinates: interior orientation, film deformation, lens distortion, atmospheric refraction, earth curvature
LO86. Students will be able to describe principles of analytical photogrammetric
LO87. Students will be able to understand Principles of aerial triangulation, concepts of the bundle adjustment,
LO88. Students will be able to describe Principles of airborne GPS triangulation and direct sensor
LO89. Students will be able to describe Photographic Coordinate Systems
LO90. Students will be able to describe Image measurement & Corrections to photo coordinates

Introduction Geodesy

LO91. Students will be able to describe the principles of Two dimensional control surveying

LO92. Students will be able to describe concept of horizontal control surveying

LO93. Students will be able to describe methods used to establish horizontal control surveying

LO94. Students will be able to compute distance, direction of line Two dimensional control surveying(traverse, triangulation, intersection) by using coordinate
LO95. Students will be able to describe the principles of vertical control surveying
LO96. Students will be able to provide elevations of fixed benchmarks with respect to the mean sea level

Advanced Geodesy

LO97. Students will be able to describe physical geodesy,
LO98. Students will be able to describe physical geodesy problems,
LO99. Students will be able to describe gravity anomaly,
LO100. Students will be able to describe gravimeter,
LO101. Students will be able to describe gravity observations

Theory of Errors and Adjustment Computations

LO102. Students will be able to describe random error theory,

LO103. Students will be able to describe propagation of random errors in indirect measured quantities, , Students will be able to describe weight of observation,

LO104. Students will be able to describe principles of least squares,

Global Positioning System (GPS)

LO105. Understand the definition and basic principle of GNSS
LO106. GNSS Satellite Generation

LO107. Understand GPS Errors and Biases
LO108. Know Carryout static or kinematics measurements within a given site.
LO109. Mark control points within the required distance through the given area
LO110. Understand major GNSS satellite components
LO111. Know GPS Time System
LO112. Understand GPS Measurement mode

Transportation planning

LO113. This course provides an in-depth exploration of various components of the urban transportation planning process, with emphasis on theories on modeling.
LO114. The principle behind the conventional four-stage transport planning model (namely, trip generation, trip distribution, modal split and trip assignment)
LO115. Understand the economic role of transportation in urban areas,
LO116. land-use impacts of transportation projects,
LO117. Elements of Traffic Indicators.
LO118. Road Infrastructure supply (road marking, road sign, traffic signal, parking facilities)
LO119. Traffic system performance
LO120. Traffic safety elements.

LO121. The role of transportation within the global climate change.

Highway Engineering- (I,)

LO122. Understand the importance of transportation,
LO123. Transportation systems,
LO124. The course helps the student to understand on selection of the route highway based on the requirements like Short Easy safe Economical.
LO125. Understand the components of road structures,
LO126. different highway classification
LO127. Types of roads structures
LO128. Understand factors governing geometric design,
LO129. Computation of sight distance,
LO130. Elements of Horizontal alignment
LO131. Elements of vertical alignment
LO132. Understand the computation of earth work.
LO133. Understand the concept of traffic Engineering concept

Ministry of Education (Table 1)
Higher Education Sub-sector
Test Blueprint (Table Specification) for BSC in Geomatics Engineering

Themes	Name of Courses	Credit hour	Weight of Courses in%	General objective/competencies	Specific objectives	Learning outcomes								No. of items
						Cognitive						Affective	Psychomotor	
						Remembering	Understandin	Application	Analysis	Evaluation	Creation/			
Basic of Surveying Share of the theme one in % (10.53%)	**Introduction to Surveying**	**3**	**5.26**	explain the basic concepts of surveying, describe branches and application of surveying explain basic surveying instruments, units of measurements , Scales , precision, accuracy, Errors and mistakes, corrections, angles and vertical distance measurement, direction, traversing explain basic measurement in surveying	LO 1		X	X						2
					LO 2		X							1
					LO 3		X							1
					LO 4				X					1
					LO 5				X					1
					LO 6				X					1
					LO 7				X					1
	Construction surveying	**3**	**5.26**	The student understands the principle of setting out of all civil works like highway, building, irrigation	LO 8		X							1
					LO 9		X							1
					LO 10		X							1
					LO 11		X							1
					LO 12			X						1
					LO 13			X						1
					LO 14				X					1
					LO 15					X				1
GIS and Cartography Share of	**Introduction Cartography**	**3**	**5.26**	Students will be able to design and compile different purpose maps	LO 16	X	X							2
					LO 17		X							1
					LO 18		X							1
					LO 19		X		X					2
					LO 20		X		X					2

the theme two in % (36.84%)	**digital Cartography**	**3**	**5.26**	Up on successful completion of the course, students will be able to project and compile maps using recommended software programs	LO 21	X								1
					LO 22		X							1
					LO 23		X							1
					LO 24		X							1
					LO 25		X							1
					LO 26		X							1
					LO 27		X							1
					LO 28						X			1
	Topographic Surveying	**3**	**5.26**	Students will be able to produce a topographic map of an area tied into a closed traverse, using stadia, total station and Software by recording physical features such as: structures, utilities, land forms, water boundaries, vegetation, etc.	LO 29		X							1
					LO 30		X							1
					LO 31		X							1
					LO 32		X							1
					LO 33			X						1
					LO 34			X						1
					LO 35		X							1
					LO 36						X			1
	GIS I	**3**	**5.26**	The students will be able to explore fundamental principles of Geographic Information Systems (GIS) and its applications including hardware and software	LO 37		X							1
					LO 38		X							1
					LO 39		X							1
					LO 40		X							1
					LO 41									0
					LO 42									0
					LO 43		X							1
					LO 44		X							1
					LO 45									0
					LO 46		X							1
					LO 47									0
					LO 48						X			1
	GISII	**3**	**5.26**	students will be able to provide an understanding of spatial analysis, techniques, available within GIS environment	LO 49	X	X	X			X			4
					LO 50	X		X	X		X			4
	Spatial Database Management	**3**	**5.26**	Student understand the concept of explain spatial data organization structures at various spatial scales; create conceptual	LO 51		X							1
					LO 52		X							1
					LO 53									0
					LO 54									0

	System			models of data using top down and bottom up approaches; translate conceptual models to logical and physical data models using GIS database software;	LO 55		X							1
					LO 56		X							1
					LO 57		X							1
					LO 58		X							1
					LO 59						X			1
					LO 60						X			1
	Cadastral Surveying	**3**	**5.26**	Understand the concept of cadastral survey and property registration	LO 61	X	X							2
					LO 62		X							1
					LO 63		X							1
					LO 64		X	X						2
					LO 65		X							1
					LO 66		X							1
Remote Sensing and Photogrammetry Share of the theme three in % (21.05%)	**introduction to Remote Sensing**	**3**	**5.26**	Students will be able to Understand the concepts of remote sensing and handle the image processing Understand the advantage of remote sensing in different application	LO 67	X	X							2
					LO 68		X	X						2
					LO 69		X	X						2
					LO 70		X	X						2
	DIA	**3**	**5.26**	students will be able to have working knowledge of sophisticated methods and techniques for collecting, processing and analysing remotely sensed data; as well as the theory and practice of undertaking remote sensing projects	LO 71	X	X							2
					LO 72		X	X	X					3
					LO 73		X	X		X				3
	Introduction to Photogrammetry	**3**	**5.26**	Students will be able to read, interpret and use aerial photographs for various purposes, particularly for plotting	LO 74		X							1
					LO 75		X							1
					LO 76		X							1
					LO 77		X							1
					LO 78									0
					LO 79		X							1
					LO 80									0
					LO 81									0

				topographic maps and measurements	LO 82		X							1
					LO 83					X				1
					LO 84					X				1
	Analytical Photogrammetry	**3**	**5.26**	Students will be able to the concepts of analytical photogrammetric principles	LO 85		X							1
					LO 86		X							1
					LO 87		X		X					2
					LO 88				X					1
					LO 89				X					1
					LO 90				X	X				2
Geodesy **Share of the theme four in % (21.05%)**	**Introduction Geodesy**	**3**	**5.26**	Students will be able to calculate Two-dimensional control surveying Identify strengths and weaknesses of different map projection coordinate systems Perform forward and inverse computations in zones using the transverse Mercator map projection	LO 91		X							1
					LO 92		X							1
					LO 93		X							1
					LO 94					X				1
					LO 95		X			X				2
					LO 96		X			X				2
	Advanced Geodesy	**3**	**5.26**	Students will be able to Explain the concept of physical geodesy, gravity measurements, reduce gravity observation and Explain coordinate transformation parameters.	LO 97		X							1
					LO 98		X	X						2
					LO 99		X			X				2
					LO 100		X							1
					LO 101		X			X				2
	Theory of Errors and Adjustment Computations	**3**	**5.26**	Students will be able to understand the basic statistical concepts related to small data sets Students will be able to identify random error theory including the normal distribution, standard normal distribution, identify random error	LO 102		X		X					2
					LO 103		X		X	X				3
					LO 104		X		X					2

				sources and propagation Students will be able to Identify propagation of random errors in indirectly measured quantities										
	Global Positioning System (GPS)	**3**	**5.26**	explain the differences between planar, spherical, ellipsoidal and geodetic surfaces in surveying discuss the source of GPS data and the satellite coverage required for XYZ measurements identify sources of errors in satellite survey data input convert latitude and readings to northing and easting distances on a spherical surface	LO 105		X							1
					LO 106		X							1
					LO 107		X							1
					LO 108		X							1
					LO 109		X							1
					LO 110		X							1
					LO 111				X					1
Transportation and Highway Engineering Share of the theme five in % (10.53%)	**Transportation planning**	**3**	**5.26**	Understand the fundamentals of urban transportation planning and the types of skills and knowledge that transportation planners need and application of the results of the forecasting to identify the right type of the transportation system needed to cater to the future demand and quantify the same.	LO 112		X							1
					LO 113		X							1
					LO 114		X		X					2
					LO 115		X							1
					LO 116									0
					LO 117		X							1
					LO 118		X							1
					LO 119									0
					LO 120		X							1
	Highway Engineering- (I,)	**3**	**5.26**	Students will also be able to understand the elements on selection of new route develop and apply concepts of geometric design for rural and urban roads and highways.	LO 121		X							1
					LO 122		X							1
					LO 123									0
					LO 124									0
					LO 125		X							1
					LO 126									0
					LO 127		X							1
					LO 128									0
					LO 129				X					1

					LO 130				X					1
					LO 131				X					1
					LO 132		X							1
					Total									**150**

Key: In the cells/boxes there are numbers that indicate the number of items that correspond to the levels of domains.

Percent share for Theme i $= \frac{Total\,Credit\,hour\,of\,the\,Theme\,i}{Total\,Credit\,hour\,of\,the\,Program\,i}$x100

Percent share for Course i $= \frac{Credit\,hour\,for\,Course\,i}{Total\,Credit\,hour\,of\,the\,Theme\,i}$x Percent share for Theme i

Total test items for Theme i $= \frac{Total\,Credit\,hour\,for\,Theme\,i}{Total\,Credit\,hour\,for\,Program\,i} X\,Total\,of\,items$ for the program

Total of items for course $= \frac{Credit\,hour\,for\,Course\,i}{Total\,Credit\,hour\,for\,Theme\,i} X\,Total\,number\,of\,items\,for\,Theme\,i$

5. Conclusion

Exit examination can have a vital role in producing knowledgeable, skillful and attitudinally matured graduates. It contributes to prepare competent graduates as it can serve as a quality check for effectiveness. It also helps in improving academic programs quality and effectiveness. Furthermore, it can create the platform for cooperation among academic programs at different universities to work jointly to improve the programs quality.

In view of this, this document is produced to assist the setting of the exit examinations for all programs, which is being delivered by Ministry of Education. To meet the graduation profile, competency and learning outcome, exit exam competency selection and identifying core course was done for 2015 EC graduating students. As a result, preparing test blueprint is necessary to prepare fairly distributed items based on the above criteria. Total number of exit exam question have 150 and it have also 19 total course and it has 57 credit hours

6. Appendix

Table 2: Calculation of share of themes, courses and items from a course from a total of 150 test items for Geomatics Engineering program

Themes	Course Name	Learning outcomes	Credit hour	Weight of course or proportion	Number of test items from each course	**Cognitive**						**Affective**	**Psychomotor**	Total
						Remember	Understand	Apply	Analyze	Evaluate	Create			
Basic of Surveying Share = 16 items from the total	1.Introduction to Surveying		3	3/6 = 0.5	0.5* 16= 8	-	3	1	4	-	-	-	-	8
	2.Construction surveying		3	3/6 = 0.5	0.5* 16= 8	-	4	2	1	1	-	-	-	8
	Theme one total credit		**6**		**=16**	-	-	-	-	-	-	-	-	-
GIS & Cartography Share = 55 items from the total	1. Introduction to Cartography		3	3/21 = 0.14	0.14*55 = 7	1	4	-	2	-	-	-	-	7
	2. Digital Cartography		3	3/21 = 0.14	0.14*55 = 8	1	6	-	-	-	1	-	-	8
	3. Topographic Survey		3	3/21 = 0.14	0.14*55 = 8	-	5	2	-	-	1	-	-	8
	4. Geographical Information System I (GIS I)		3	3/21 = 0.14	0.14*55 = 8	-	7	-	-	-	1	-	-	8
	5. Geographical Information System II (GIS II)		3	3/21 = 0.14	0.14*55 = 8	2	1	2	1	-	2	-	-	8
	6. Spatial Database Management System		3	3/21 = 0.15	0.15*55 = 8	-	6	-	-	-	2	-	-	8
	7. Cadastral Surveying		3	3/21 = 0.15	0.15*55 = 8	1	6	1	-	-	-	-	-	8
	Theme two total credit		**21**		**= 55**		-	-	-	-	-	-	-	-
Remote Sensing	1. Introduction to		3	3/12 = 0.25	0.25*32	1	4	3	-	-	-	-	-	8

and Photogrammetry Share = 32 items from the total	Remote Sensing				= 8									
	2. Digital Image Analysis (DIA)		3	3/12 = 0.25	0.25*32 = 8	1	3	2	1	1	-	-	-	8
	3. Introduction to Photogrammetry		3	3/12 = 0.25	0.25*32 = 8	-	6	-	-	2	-	-	-	8
	4. Analytical Photogrammetry		3	3/12 = 0.25	0.25*32 = 8	-	3	-	4	1	-	-	-	8
	Theme three total credit		**12**		**=32**		-	-	-	-	-	-	-	-
Geodesy Share =**31** items from the total	1. Introduction to Geodesy		3	3/12 = 0.25	0.25*31 = 8	-	5	-	-	3	-	-	-	8
	2. Advanced Geodesy		3	3/12 = 0.25	0.25*31 = 8	-	5	1	-	2	-	-	-	8
	3. Theory of Errors and Adjustment Computations		3	3/12 = 0.25	0.25*31 = 7	-	3	-	3	1	-	-	-	7
	4. Global Positioning System (GPS)		3	3/12 = 0.25	0.25*31 = 8	-	7	-	1	-	-	-	-	8
	Theme three total credit		**12**		**=31**	-	-	-	-	-	-	-		
Transportation and Highway Engineering Share = **16** items from the total	1. Transportation planning		3	3/6 = 0.50	0.5* 16= 8	-	7	-	1	-	-			8
	2. Highway Engineering I		3	3/6 = 0.50	0.5* 16= 8	-	5	-	3	-	-			8
	Theme three total credit		**6**		**= 16**	-	-	-	-	-	-	-		
Total for the program			57											**150**

Note: The number of items assigned in the levels of domains is based on the nature of learning outcomes/objectives.