

**Ministry of Education**

**Identified Competency Focus Areas and Core Courses for Ethiopian Higher Education Institutions’ Exit Examination**

**Program: - Construction Technology & Management in BSc.**

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1. Introduction

Starting in 2015 E.C, the Ministry of Education is introducing an exit examination for most of the undergraduate programs in the universities of Ethiopia. The primary purpose of the exit exams is to assess students' educational achievement in the courses in their major area of the study program. The exam is supposed to measure the achievement of learning objectives in three domains namely knowledge, skill, and attitude in the program they are learning as a whole based on some selected main course.

Most of mankind’s economic, social, political, environmental, and public reforms and day-to-day activities are dependent on the infrastructure delivered by the Construction Industry. The same is true in Ethiopia. As a developing country, there is a construction boost and related problems of construction management are observed even if research is required to figure out.

It is said that around 60% capital budget is allocated to construction projects in developing countries. Hence, the importance of the Construction Technology and Management program in solving the construction problems and managing the huge capital budget allocated to construction is boldly visible to construction stakeholders. Understanding the necessity of the program, visionary academicians and other concerned parties opened the program the at BSc level in Ethiopia in 2002 in the formerly called ‘south technology compass under Addis Ababa University’, currently called ‘EiABC’. Now the program is opened in around 24 universities of Ethiopia.

In Ethiopia, Construction Technology and Management have a great role to play in supporting economic development and contributing towards the improvement of the living standard of the people. This role and contribution input is at different geospatial scales, from the Federal to the local, in both an urban and a rural context. As a country that is moving into a rapid phase of growth, the contribution that construction technology and management can make, to ensure that this growth is sustainable; is a particularly important one. It is therefore of vital importance that construction technologists and managers are professionally prepared to meet this growth challenge and contribute to sustainable development.

# 2. Expected profile of CoTM graduates

## 2.1. General Profile

* Ability to apply knowledge of mathematics, statistics, science, management, economics, and engineering.
* Ability to design, construct, and supervise different construction engineering works, as well as to analyze and interpret data.
* Ability to function on multi-disciplinary teams.
* Ability to identify, formulates, analyze and solve construction sector problems.
* Understand professional and ethical responsibility.
* Ability to communicate effectively.
* Knowledge of up-to-date issues.
* Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
* Understanding and working knowledge of safety and environmental aspects of construction technology & management practices.
* Able to develop effective planning systems of project management to improve productivity.
* Be able to conduct experiments, basic and applied research in relation to construction industries to solve various organizational and social problems.
* Ability to teach the fundamentals of construction technology & management courses.
* Keep abreast of new technologies in construction technology & management. Also to provide orientation and/or training to subordinates as required.
* Able to apply state-of-the-art software in construction management.

# 3. Competencies and learning outcomes

## 3.1 Core Learning Outcome

The main learning outcome of the COTM program students is to manage construction projects successfully through application of knowledge, skills and attitudes learned in their stay by constructing projects as per required quality, cost (Budget), completing on time and keeping safety for workers, general public, end users and environment.

## 3.2 Expected Competencies

Professional competence is understood as the all-encompassing, internalized capability to offer lasting performance in a particular program. The CoTM program's main goal is to prepare professionals for managing construction projects with an effective management system, handling contracts, and conducting research to find better solutions to problems that actually arise on the job site with regard to construction management, methods, and materials and equipment management. The program will produce managing engineers who are highly qualified and knowledgeable in the fields of structural, geotechnical, and highway engineering. Graduates will also have a thorough understanding of construction technology and project management skills, enabling them to actively participate in the development, planning, and management of construction and infrastructure projects. The following list of competencies can be used to summarize a Construction Technology and Management professional:-

## Construction Technology Related Competence

This competency covers the methods, technologies and processes of construction of buildings and other structures. Candidates should have a clear understanding of the design and construction processes commonly used in the industry such as; applying Practical and scientific knowledge of construction, Conduct Setting out, Understanding the construction process, methods, and techniques, identifying required materials and equipment, and ability to communicate through writing, and graphical and technical drawing.

## Construction Engineering Related Competence

This competency covers basic understanding of Architectural and Engineering design methods and processes of buildings and other structures.

## Construction Management Related Competence

* Proper planning and organization of the works,
* Effective use of resources,
* Ability of completion of works within estimated budget and specified time,
* Ensuring necessary quality of the work by planning ahead and conduction inspection and tests
* Proper usage of equipment and latest methods of construction and modern technology,
* Ability to control the contract agreed upon and specification,
* Motivating people to work to their best and creating an organization that works as a team,
* Taking sound decisions at respective management levels,
* Proper communication and reporting of the works executed,
* Provisions of safe and satisfactory working conditions for all workers,
* Evaluating performance of executed construction works against planning,
* Understanding and analyzing the proper sequence of flow of construction works,
* Ability to prepare or evaluate payment certificates
* Ability to use different scheduling tools such as Primavera & MS project
* Ability to negotiate and conflict handling, and
* Ability to risk identification and analyze its effect

## Other skills

* General engineering and software manipulation skills etc.

# 4. Courses to be Included in Exit Exam

The Ministry of Education suggests that the exit exam should contain 10 to 15 Courses from a given program. Based on this suggestion, the working team has come up with 17 courses if there is room for accommodation considering the vast nature of the program. If not the two yellow back ground highlighted courses namely ‘modern Construction Technology and BIM’ and ‘Construction Quality Management’ could be eliminated from the list assuming that modern construction can be included in building construction and other related courses exam. Similarly, quality management can be included in other management courses such as specification and performance management. In addition, some courses given in sequence as I & II are merged as one course for this exit exam purpose.

1. Design of Reinforced Concrete Structures
2. Design & Construction of Water Works
3. Highway Engineering I & II
4. Foundation Engineering
5. Construction Materials I & II
6. Building construction I & II
7. Construction Specification and Quantity Surveying
8. Human Resource Management in Construction
9. Financial Management in Construction
10. Construction Equipment And plant management
11. Cost Engineering
12. Construction Planning and Scheduling
13. Health and Safety Management in Construction
14. Construction Procurement and Contract Management
15. Construction Performance & Resource Optimization

# 5. Categorizing courses in to themes

The working team has revised the COTM harmonized curriculum and identified the following 17 courses that can be included in the exit exam in Ethiopia starting from 2015 E.C.

|  |  |  |  |
| --- | --- | --- | --- |
| Construction Engineering courses (23.5%) | Construction Technology (23.5%) | Construction Management (53%) | Remark |
| Design of Reinforced  Concrete Structures | Construction  Materials I & II | Human resource Management in  Construction |  |
| Design & Construction of Water Works | Building construction I & II | Financial Management  in Construction |  |
| Highway Engineering I & II | Construction Specification and Quantity Surveying | Construction Equipment And plant management |  |
| Foundation Engineering | Modern Construction  Technology and BIM | Cost Engineering |  |
|  |  | Construction Quality Management |  |
|  |  | Construction Planning and Scheduling |  |
|  |  | Health and Safety Management in Construction |  |
|  |  | Construction Procurement and Contract Management |  |
|  |  | Construction Performance & Resource Optimization |  |

# 6. Conclusion

The proposed exit exam might help students to provide attention to the above major courses in Construction Technology and Management Program and drive them to acquire the above-mentioned competence and others. The working team has identified 17 core and major courses for the exit exam which are categorized in three areas namely Construction technology (23.5%), Construction Engineering (23.5%), and Construction Management (53%) based on the Harmonized Curriculum.

Moreover, the team believes that this exit exam is prepared to serve as a starting point and so many individuals or universities would develop it further. In addition, the content of this exit exam document will be subject to revision whenever the curriculum is revised or when the need to change arises from stakeholders.