



**UNIVERSITI KUALA LUMPUR**  
**Malaysian Institute of Marine Engineering Technology**

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**FINAL EXAMINATION**  
**SEPTEMBER 2016 SESSION**

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**COURSE CODE** : LGB 42003  
**COURSE NAME** : SHIPYARD AND ENGINEERING PROJECT MANAGEMENT  
**PROGRAMME NAME** : BACHELOR ENGINEERING TECHNOLOGY IN NAVAL  
ARCHITECTURE AND SHIPBUILDING  
**DATE** : 16 JANUARY 2017  
**TIME** : 09:00 AM - 12:00 AM  
**DURATION** : 3 HOURS

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**INSTRUCTIONS TO CANDIDATES**

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1. Please CAREFULLY read the instructions given in the question paper.
  2. This question paper has information printed on both sides of the paper.
  3. This question paper consists of TWO (2) sections; Section A and Section B.
  4. Answer ALL questions in Section A. For Section B, answer THREE (3) questions only.
  5. Answer all questions in English language only.
  6. Please write your answers on the answer booklet provided.
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**THERE ARE 7 PAGES OF QUESTIONS, INCLUDING THIS PAGE.**

**SECTION A (Total: 40 marks)**

**INSTRUCTION: Answer ALL questions**  
**Please use the answer booklet provided.**

**Question 1**

- a. There are many construction materials in a shipyard such as aluminum, mild steel, timber and composite fibers. In managing the material storage, differentiate the storage requirements for

- Composite fibers (5 marks)
- Aluminum (2 marks)
- Stainless steel (3 marks)
- Timber (5 marks)

(15 marks)

- b. The project manager ensures all routine maintenance and repair works of a ship undergoing a specific routine at a shipyard are carried out as planned. Underwater works may commence upon up-slipping of a ship. After all works are completed the ship is down slipped. Before any down slipping operation or launching, the project manager must ensure certain important final checks are carried out. Briefly explain five (5) important pre-down slipping preparations undertaken by a project manager.

(5 marks)

**Question 2**

- a. The Critical Path (CP) of a project reflects the critical nature of the tasks involved. It is the sequence of tasks that constitute the longest duration time for a project to complete. If any one of the task or activity in the CP is delayed, then the entire project would be affected or delayed, and a new CP may develop. A CP has zero slack. Zero slack indicates zero allowance for delay. Briefly describe six (6) approaches how you can effectively reduce the total project duration time.

(6 marks)

b. Consider the following maintenance activities (Table 1) which have been planned for a 20 meter aluminum boat of weight approximately 50 tons, at MIMET Shipyard with a slipway facility of 200 tons. If work activity 'c' and 'd' can begin immediately after surface services 'b', while work activity safety checks 'f' can only be affected on completion of work activity 'c', 'd' and 'e';

i. Develop your Critical Path network diagram. (evaluate all  $E_s$ ,  $E_f$ ,  $L_s$ ,  $L_f$ , Slack, CP and duration of CP in a simple table) (use the following rules as your guide)

$$E_f = E_s + \text{activity time}$$

$$E_s = E_f - \text{activity time}$$

$L_f =$  smallest  $L_s$  of immediate successor (or, for last node, the highest  $E_f$  of last node)

$$L_s = L_f - \text{activity time}$$

$$\text{Slack} = L_f - E_f$$

$$E_s = \text{highest } E_f \text{ predecessor}$$

(12 marks)

ii. Identify the following:

- Your CP route
- Your project duration

(2 marks)

Table 1: Up-slipping of 20m aluminum boat at MIMET Slipway.

activity	description	duration (day)
A	Up-slipping works & related requirements	1
B	Connecting of general services & surface services	2
C	Paint & repair work – external hull	3
D	Paint & repair work – internal hull	11
E	Other works – underwater fittings & appendages	6
F	Disconnect general services & safety checks	2
G	Down-slipping works & related requirements	1

**SECTION B (Total: 60%)**

**INSTRUCTION: Answer only THREE questions.  
Please use the answer booklet provided.**

**Question 3**

- a. The lean concept in ship building focuses on minimizing of waste, both material and labor through using of improved technology, improved material and efficient processes. A shipyard manager thus must strive for a smooth production process in the shipyard. As such, a most suitable shop floor production layout should be in place that conforms to the nature of production process chosen. Among the most common layouts as found in many modern shipyards are namely, *fixed position layout*, *product layout*, *process layout* and *group technology layout*. Considering the layouts given briefly sketch and evaluate the layout most suitable for a modular construction approach that focuses on the lean concept in shipbuilding.

(10 marks)

- b. A shipyard that neglects issues on work safety, materials management, effectiveness of production processes, suitability of production layout and suitability of shipyard location would ultimately find itself being displaced from the competitive maritime industry. Looking at the issue on suitability of shipyard location, develop five (5) important criteria in determining the most suitable location for a shipyard.

(5 marks)

- c. A project manager must plan for the most cost effective and efficient approach in getting the resources for his project. This plan is called *resource scheduling* and is an important activity that helps a project in meeting the datelines as set by the project planner. Resources, such as materials and labor, that are required in the construction or repair of ships in a shipyard, must be made available based on planned project datelines. This resource scheduling usually involves a few proven approaches. Examining the three (3) most common approaches in acquiring resources, namely, *manufacturing in-house*, *sub-contracting manufacture* and *purchasing*, investigate the reason of adopting the *manufacture in-house* in getting the resources for a project.

(5 marks)

**Question 4**

a. There are many methods where a ship could be brought out of the water for maintenance purpose. Compare the following facilities, looking at its requirements, construction, method/usage and limitations.

i. Ship lift (synchro lift) (5 marks)

ii. Floating dock (5 marks)

(10 marks)

b. An elaborate inventory of equipment and facilities must be made available in the shipyard to ensure that ships built or repaired are adequately supported and go through a smooth process all the way before final acceptance by the customer. List down and explain five (5) typical shipbuilding facilities in a modern shipyard.

(10 marks)

**Question 5**

a. The S-Curve is an important project management tool. It is used by management to assess the infrastructural cost loading over the expected duration of a project. Briefly discuss the importance of S-Curve in project management.

(5 marks)

b. Program Evaluation Review Technique (PERT) is a form of project planning similar to Critical Path Method (CPM) but takes on a slightly different approach. A project manager may encounter situations where duration times for project tasks are uncertain. This uncertainty may require a mathematical approach to determine the mean times for each task. Briefly explain, using a formula, how the mean time of an uncertain task duration is derived.

(5 marks)

c. Referring to task information at Table 2. Calculate the mean time ( $t_i$ ),  $E_s$ ,  $E_f$ ,  $L_s$ ,  $L_f$ , Slack, Critical Path (CP) and duration of CP. Fill up all the data on a separate answer sheet.

(10 marks)

Table 2: Task Information

Activity	Immediate predecessor	$a_i$	$m_i$	$b_i$	$t_i$	$E_s$	$E_f$	$L_s$	$L_f$	Slack	CP
A	-	5	7	8							
B	-	4	6	7							
C	-	5	5	5							
D	A	3	4	6							
E	A	4	5	7							
F	B,C	6	7	9							
G	B,C	4	6	8							
H	D,E	5	7	9							
I	F,G	2	4	6							

(use the following rules as your guide)

$E_f = E_s + \text{activity time}$

$E_s = E_f - \text{activity time}$

$L_f = \text{smallest } L_s \text{ of immediate successor (or, for last node, the highest } E_f \text{ of last node)}$

$L_s = L_f - \text{activity time}$

$\text{Slack} = L_f - E_f$

$E_s = \text{highest } E_f \text{ predecessor}$

**Question 6**

a. Project planning helps determine the duration of a project as reflected by the Critical Path along which activities are carried out and cannot be delayed. Effective management of a complex project requires a systematic project planning approach. That approach is called the Critical Path Method (CPM).

i. Using the forward and backward passes, manually develop a network diagram (on a separate answer sheet) based on the task information at Table 3, showing all the task activities.

(5 marks)

ii. Compile all  $E_s$ ,  $E_f$ ,  $L_s$ ,  $L_f$ , Slack, Critical Path (CP) and duration of CP manually using Table 3 below (on a separate answer sheet).

(10 marks)

iii. Identify CP and its duration.

(5 marks)

Table 3: Task Information

Task	Immediate Predecessor	Duration (days)	$E_s$	$E_f$	$L_s$	$L_f$	Slack	CP
A	-	12						
B	-	8						
C	A	8						
D	C,I	8						
E	B	6						
F	B	6						
G	E,F	9						
H	E,F	5						
I	A	8						
J	G,H	6						

(use the following rules as your guide)

$E_f = E_s + \text{activity time}$

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$L_s = L_f - \text{activity time}$

$\text{Slack} = L_f - E_f$

$E_s = \text{highest } E_f \text{ predecessor}$

END OF QUESTIONS