



**UTHM**

Universiti Tun Hussein Onn Malaysia

**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER II  
SESSION 2013/2014**

COURSE NAME : CONSTRUCTION COST ESTIMATION  
COURSE CODE : BPD 31003  
PROGRAMME : 3 BPC  
EXAMINATION DATE : JUNE 2014  
DURATION : 3 HOURS  
INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF SEVEN (7) PAGES

Instruction: Use information in Table A to answer Q1 until Q3. Any other assumptions can be made if no data given.

Table A: Information for estimating works

<b>A. Materials</b>	
Cost of precast concrete pile (including delivery to site)	RM 870.00
Cost of cement per bag (50kg)	RM 18.00
Cost of 1 tonne sand	RM 120.00
Cost of 1 tonne aggregate	RM 150.00
Cost of 1 m <sup>2</sup> plywood (12 mm thick)	RM 14.00
Cost of 1 tonne timber	RM 930.00
Cost of 1 m <sup>3</sup> fine sand	RM 40.00
Cost of 1 piece ceramic tile (200 mm x 250 mm x 9 mm)	RM 4.00
Cost of 1 piece homogenous tile (100 mm x 150 mm x 7 mm)	RM 1.70
Allow for nails and mould oil	15%
<b>B. Machine and Equipment</b>	
Cost of rent for 1 day of 25 tonne crane (inclusive operator and diesel)	RM 470.00
Cost of rent for 1 day of hydraulic hammer (inclusive operator and diesel)	RM 470.00
Cost of rent mixer	RM 300.00
Cost of diesel to mixer	RM 25.00
Cost of lubrication oil to mixer	RM 12.00
Cost of rent mixer for 1 day of preparing mortar (inclusive diesel and lubrication oil)	RM 35.00
<b>C. Labour</b>	
Worker wages for 1 day:	
• Skilled worker and Operator	RM 60.00
• Unskilled worker	RM 40.00
Cost of unloading 1 bag of cement	RM 1.00
<b>D. Additional Percentage of Shrinkage and Wastage</b>	
Concrete	50%
Formwork	10%
Mortar	33.33%
Tile	5%
Percentage of profit and overhead	10%

**Q1** Mr Rahmat, an estimator is responsible to prepare a cost estimating for a seven storey office lot in Johor Bahru, Johor. The building is built using precast concrete pile to transmit the building loads to the foundation and the ground soil layers whether these load vertical or inclined.

(a) Calculate build-up rates for supply only and deliver based on Table Q1:

- (i) Total number of piles 12.00 m long complete with 350 mm x 350 mm x 2kg mild steel head and 350 mm x 350 mm x 15 kg mild steel shoe (per No.).  
(5 marks)
- (ii) Total length of pile extension for pile length exceeding 3.00 m (per m).  
(6 marks)
- (b) Calculate build-up rates for total driven length of precast concrete pile (per m) based on Table **Q1**.  
(5 marks)
- (c) Calculate build-up rates for concrete pile head and reinforcement for capping (per No.) based on Table **Q1**.  
(2 marks)

**Q2** There are four basic ingredients in varying proportions that are required for mixing concrete. The ingredients are Portland cement, sand, aggregate and water. The combined mix is measured in cubic metre (m<sup>3</sup>). Mixing can be done manually in a large plastic tub or wheelbarrow or in a rotating portable cement mixer.

- (a) Discuss water as an important constituent in concrete.  
(3 marks)
- (b) Calculate build-up rates per m<sup>3</sup> for vibrated reinforced concrete Grade 20 (1:1½:3 – 19mm aggregate) in ground beam using machine with output of 14/10. This produces approximately 4.00 m<sup>3</sup> of mixed concrete in 1 hour (Refer Table **Q2(a)**).  
(17 marks)
- (c) Calculate build-up rates per m<sup>2</sup> for formwork to sides of ground beam (Refer Tables **Q2(b), (c), and (d)**).  
(9.5 marks)

**Q3** Floor finishes is described as any finish material applied over a floor structure to provide a walking surface. There are various types of floor finishes. The types are cement, homogeneous tiles, ceramic tiles, granite and marble. All these types offer different range of costs.

- (a) Calculate build-up rates per m<sup>2</sup> for 20 mm thick cement and sand (1:3) screeded bed to receive ceramic tiles to floor level or to fall not exceeding 15° from horizontal on concrete base using machine. This produces approximately 1.25 m<sup>3</sup> of concrete base in 1 hour (Refer Table **Q3(a)**).  
(13.5 marks)

- (b) Calculate build-up rates per m<sup>2</sup> based on Tables **Q3(b)**, and **(c)**:
- (i) 200 mm x 250 mm x 9 mm thick ceramic floor tiles bedded, jointed and pointed in cement and sand mortar (1:3) to floor slab. Use Q3(a) answer for the cost of cement and sand mortar (1:3).  
(6.5 marks)
  - (ii) 100 mm x 150 mm x 7 mm thick homogeneous tiles bedded, jointed and pointed in cement and sand mortar (1:3) to floor slab. Use Q3(a) answer for the cost of cement and sand mortar (1:3).  
(6.5 marks)

- Q4** (a) Painting is defined as covering of surface of wood, plaster, masonry, metal and other materials with a compound for protection from damage by water, rust, corrosion, insects and mould. It also improves the aesthetic of a building.

Compare the process of painting wood surfaces and plastered wall surfaces.  
(6 marks)

- (b) Miss Nina lives in an apartment for more than 10 years in Kuala Lumpur. Since lived in the apartment, she never made any alteration or renovation with the apartment. Until one day, she decided to make some changes with her apartment and she has considered to repaint the apartment. However, she is worried about the cost for repainting her apartment. She needs to know how much she would spend for repainting the apartment.

Outline the cost estimating process for repainting works of Miss Nina's apartment.  
(12 marks)

- Q5** Tender document is prepared to seek tenders (offers). Tender documents may be prepared for a range of contracts such as equipment supply, the main construction contract, demolition and enabling works. A tender document may include a letter of invitation to tender, the form of tender, specifications, preliminaries, a tender pricing document and design drawings.

Explain the tender pricing document.  
(8 marks)

**-END OF QUESTION-**



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PROGRAMME : 3 BPC  
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**TABLE Q1: Labour output and additional information for piling works**

Description	Unskilled Worker (hour/tonne)	Number of driven (pile/day)	Number (pile head/day)
• Unloading piles	0.75	-	-
• Output of hydraulic hammer * 1 point for 1 initial pile and 1 extension pile.	-	9 point	-
• Prepare pile head	1.00	-	35

**TABLE Q2(a): Machine output for mixing cement and sand as well as concrete works**

Machine size	Labour	Output/hour (m <sup>3</sup> )	Diesel/hour (litre)	Lubrication/hour (litre)
5 / 3½	1 operator, 1 unskilled	1.25	1.10	0.04
7 / 5	1 operator, 3 unskilled	2.25	1.60	0.06
10 / 7	1 operator, 4 unskilled	3.25	1.80	0.07
14 / 10	1 operator, 4 unskilled	4.50	2.10	0.08
18 / 12	1 operator, 6 unskilled	5.50	2.40	0.10

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**TABLE Q2(b): Amount of reuse of formwork**

Location	Amount of reuse
Slab, roof and wall	6
Foundation, beam and column	4

**TABLE Q2(c): Amount of strutting timber**

Location	Strutting (m <sup>3</sup> )
Side of column	0.02
Sides of foundation and wall	0.04
Sides and soffit of beam	0.05
Sides and soffit of slab	0.06

**TABLE Q2(d): Labour output for formwork**

Situation	Prepare and Erection (hour/m <sup>2</sup> )		Dismantle and Keep (hour/m <sup>2</sup> )
	Carpenter	Unskilled worker	Unskilled worker
Slab, walls and associated features	1.00	0.75	0.75
Beam and column	1.50	0.75	0.75

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**TABLE Q3(a): Labour output for floor paving**

Types of paving	1 Tiler and 1 Unskilled worker (hour/m <sup>2</sup> )
Cement	0.30
Screeded bed	0.25
Trowelled bed	0.30

**TABLE Q3(b): Number of tiles for 1 m<sup>2</sup>**

Size of tiles	Number (piece)
100 mm x 150 mm	67
150 mm x 200 mm	33
200 mm x 200 mm	25
200 mm x 250 mm	20

**TABLE Q3(c): Labour output for tiles installation**

Size of tiles	1 Tiler and 1 Unskilled worker (hour/m <sup>2</sup> )	
	Floor	Wall
≥ 150 mm x 150 mm	0.75	1.00
< 150 mm x 150 mm	1.90	1.25

