Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2015/2016

COURSE NAME	:	CONSTRUCTION EQUIPMENT SELECTION
COURSE CODE	:	BNC 40503
PROGRAMME CODE	:	BNC
EXAMINATION DATE	:	JUNE/ JULY 2016
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

Q1 (a) Dragline is a versatile machine that capable to do excavation work for a multiple range of operations. It can handle materials that range from soft to medium hard. The greatest advantage of a dragline over other machine is it long reach for digging and dumping. Explain the factors to be concerned when selecting the right size of a dragline.

(4 marks)

(b) Dragline is able to excavate material and load into hauling units, such as truck or depose it in spoil piles near the pits from which it is excavated. Analyse the operation of a dragline.

(8 marks)

(c) Estimate the production in loose measure (LCY or LCM) of a hydraulic excavator having a bucket capacity of 1 LCY (0.76 LCM). The material is common earth. Average depth of cut is 12ft (3.66m) and maximum depth of cut is 21 ft (6.40m). Average angle of swing is 120°. Job efficiency is estimated at 50min/h.

(8 marks)

Q2 (a) Propose the differences between **THREE (3)** basic types of scrapers: crawler-drawn scraper, two-axle scraper and three-axle scraper.

(9 marks)

(b) During hauling, the apron is lowered to capture the material. Examine the purpose of sprinklers on the haul.

(3 marks)

(c) Explain in detail **FOUR (4)** principle forces involved in compaction.

(8 marks)

Q3 (a) Evaluate the vibration method and bored pile method in terms of its piling process, suitability and advantage. Provide sketches to support your answers.

(14 marks)

(b) In order to determine the number of haul units required to service an excavator, it is necessary to compute the time required for a haul unit to make one complete cycle. Explain the components of the haul cycle.

(6 marks)

Q4 (a) Describe **TWO (2)** types of material hoists.

(4 marks)

(b) As a specialist installer for material hoist in your company, propose some advice on requirements needed to select a material hoist that will comply with good safety practices.

(4 marks)

(c) Bulldozers are basically designed to provide tractive power for pushing work especially during the construction site clearance. With the aid of sketches, illustrate the usage of **FOUR (4)** types of dozer blades.

(12 marks)

Q5 (a) List **FOUR (4)** types of tower crane

(4 marks)

(b) Based on your understanding on the **FOUR (4)** types of mobile crane; categorise and examine them accordingly.

(16 marks)

- END OF QUESTION –

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Production = CSVBE

1.0 m^3 BMC = 1.25 LCM = 0.9 CCM

Table 1 Bucket fill factors for excavators and loaders

Material	Bucket Fill Factor
Common earth, loam	0.80-1.10
Sand and gravel	0.90-1.00
Hard clay	0.65-0.95
Wet clay	0.50-0.90
Rock, well blasted	0.70-0.90
Rock, poorly blasted	0.40-0.70

Table 2 Standard cycles per hour for hydraulic excavators

		Machine Size		
Type of Material	**Wheel Tractor**	**Small Excavator: 1 yd (0.76 m^3) or Less**	**Medium Excavator: 1¼-2¼ yd (0.94 - 1.72m^3)**	**Large Excavator: Over 2¼ yd (1.72m^3)**
Soft (sand, gravel, loam)	170	250	200	150
Average (common earth, soft clay)	135	200	160	120
Hard (tough clay, rock)	110	160	130	100

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Table 3 Swing-depth factor for hydraulic excavators

	Angle of Swing					
Depth of Cut (% of Maximum)	**45**	**60**	**75**	**90**	**120**	**180**
30	1.33	1.26	1.21	1.15	1.08	0.95
50	1.28	1.21	1.16	1.10	1.03	0.91
70	1.16	1.10	1.05	1.00	0.94	0.83
90	1.04	1.00	0.95	0.90	0.85	0.75

Table 4 Adjustment factor for trench production

Material	Factor
Loose (sand, gravel, loam)	0.60 - 0.70
Average (common earth)	0.90 - 0.95
Firm (firm plastic soils)	0.95 - 1.00