Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020

COURSE NAME	:	CONSTRUCTION PLANT MANAGEMENT
COURSE CODE	:	BFP40203
PROGRAMME CODE	:	BFF
EXAMINATION DATE	:	DECEMBER 2019/JANUARY 2020
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

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

Q1 (a) Stripping of the top soil is the process that generally undertaken as part of site preparation before actual construction works can begin. Explain why it needs to be done before construction can begin.

(2 marks)

(b) The original volume of natural state of soil is 29 m^3 and the volume changed to 32 m^3 and 26.5 m^3 during the reclamation and compaction process respectively.

(i) Calculate the loose and compaction factors for the soil.

(2 marks)

(ii) Compute the percentage of swell and shrinkage for the soil

(6 marks)

(c) **Figure Q1(c)** shows the pad foundation layout plan for a single unit bungalow house. The excavation of this foundation creates four numbers of conical piles with similar dimension. Based on information in the figure, calculate the size of each conical pile for excavation works of all pad foundation. Assume the soil swell at 9.7 % and its angle of repose of 35°.

(15 marks)

Q2 (a) A dozer is a tractor unit that has a blade attached to the machine's front. With the help of sketch, explain **THREE (3)** types of dozer blade adjustment.

(6 marks)

(b) The production of excavator is based on actual volume of materials that loaded in bucket during the excavation works. Explain **THREE (3)** types of excavator bucket volume that used to estimate the production of excavator.

(3 marks)

(c) The effective use of the shovel is dependents on the types of machines, machine's maintenance and operator, and supervisor ability to coordinate the excavation works. Recommend **FIVE (5)** constructive suggestions for improving operating efficiency of shovel.

(10 marks)

(d) Based on the following information, estimate the total production in bank measure (BCM) of a hydraulic excavator for 7 working days with effective working hour per days is 6.9 hours. You may use **TABLE 1** to estimate swing depth factor of excavator.

Bucket capacity: 1.6 m^3
Soil type: Common earth with standard cycle of 200/h
Average depth of cut: 2.81 m
Maximum depth of cut: 5.73 m
Average angle of swing: 180°
Job efficiency: 47 min/h
Bucket fill factor: 0.97
Load factor: 0.83

(6 marks)

Q3 (a) **TABLE 2** shows relevant information for earthwork cost and production rate.

(i) Calculate number of trucks would be required to service the excavator for each type of truck size.

(8 marks)

(ii) Develop cost comparison table to obtain the numbers of trucks should be used to provide the lowest loading and hauling cost.

(12 marks)

(iii) With reference to the optimum solution in (ii), what is the probability that there will be a truck available for loading at any particular instant if the truck travel time less loading time is 0.51 hours. You have to use Queueing Theory to answer this question.

(5 marks)

Q4 (a) Ready-mixed concrete truck mixer basically a mobile mixing drum mounted on a lorry chassis. Explain **THREE (3)** ways for concrete truck mixer can be employed.

(6 marks)

(b) Explain **FIVE (5)** principle elements of operating cost.

(5 marks)

(c) All construction firms need a proper planning and enforcement of the safety program to minimize accident and ensure compliance with Occupational Safety and Health Act (OSHA) and other safety regulations. As an engineer, you need to develop a safety procedure for your company. This safety procedure should include **THREE (3)** safety procedures for construction equipment, **TWO (2)** for construction of structure and **TWO (2)** for excavation works.

(14 marks)

–END OF QUESTIONS–

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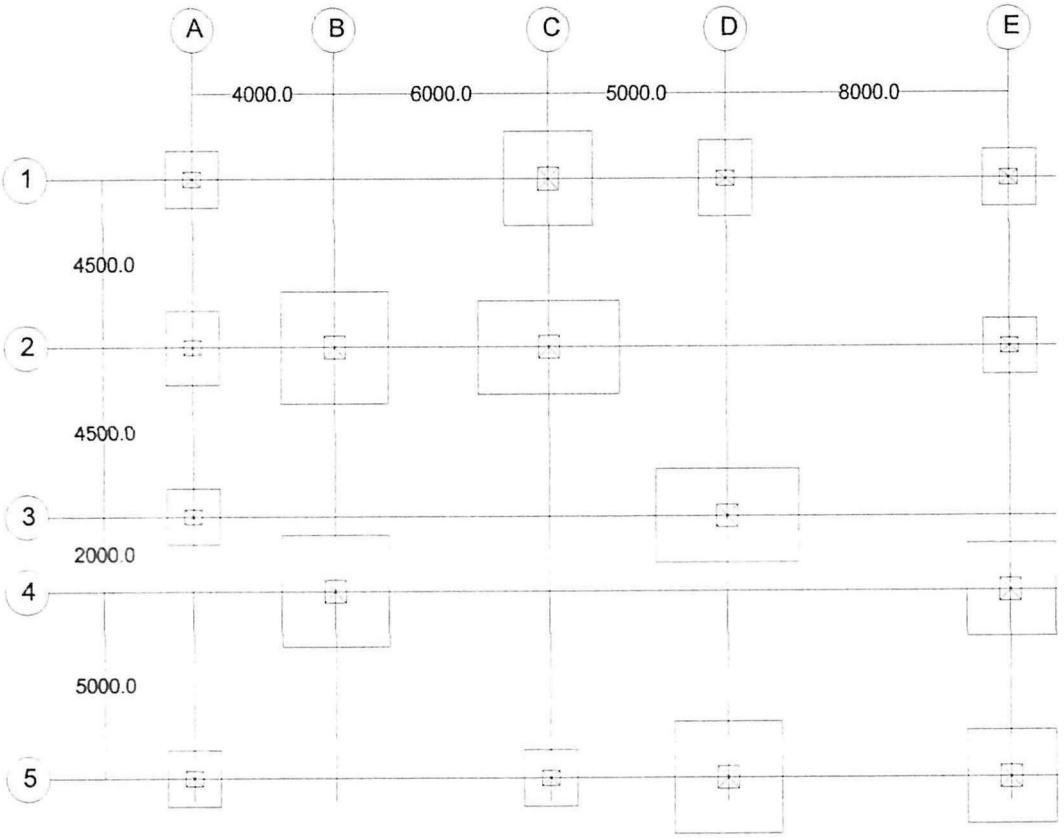

SIZE OF PAD FOUNDATION

COLUMN LOCATION	SIZE OF PAD FOOTING (mm)	DEPTH (mm)
A-1, A-3, A-5, C-5, E-1, E-2	1500 x 1500	1200
A-2, D-1	1500 x 2000	
C-1, E-4, E-5	2500 x 2500	
B-2, B-4, D-5	3000 x 3000	
C-2, D-3	4000 x 2500	

FIGURE Q1(c)

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TABLE 1

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	1.28	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 2

Item		
Dipper load/ capacity: 1.63 BCM		
Bucket fill factor: 0.87		
Load Factor: 0.79		
Job efficiency: 53 min/hour		
Dipper cycle time: 25 sec		
Rate: RM110.00/hour		
Trucks:		
Size Truck (LCM)	**Cost (RM/h)**	**Transit Time(h)**
8.4 12.6	85.00 120.00	0.45 0.55