Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2017/2018

COURSE NAME	:	PLANT & MACHINERY
COURSE CODE	:	BNC 31903
PROGRAMME CODE	:	BNC
EXAMINATION DATE	:	JUNE/JULY 2018
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **SIX (6)** 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) Propose 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 At one location, an excavation work is done by an excavator with bucket load factor of 0.8, job efficiency of 75% with the production of 175 BCM/h, load factor 0.77 and truck transit time of 0.5 hour. The type of soil is tough clay.

(a) Assess the number of trucks required for this excavation work.

(4 marks)

(b) If a dipper cycle time of this excavation is 25 second with the amount of 2.5 LCM, calculate the number of trucks required.

(6 marks)

(c) If there is only an availability of 10 trucks, calculate the production of this team.

(2 marks)

(d) Evaluate the situations and answers from Q2 (a), (b) and (c).

(8 marks)

Q3 (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)

Q4 (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. Demonstrate the components of the haul cycle.

(6 marks)

Q5 (a) Describe the function of a crane limit switch.

(2 marks)

(b) Differentiate the advantages between the horizontal jib and a luffing jib with the aid of sketches.

(6 marks)

(c) Referring to **Figure 5 (c),** the auditorium is 2 storey high. Propose the suitable machineries to be deployed, given that the office tower and TV and Music studio are 10 storey high. Justify your answer.

(12 marks)

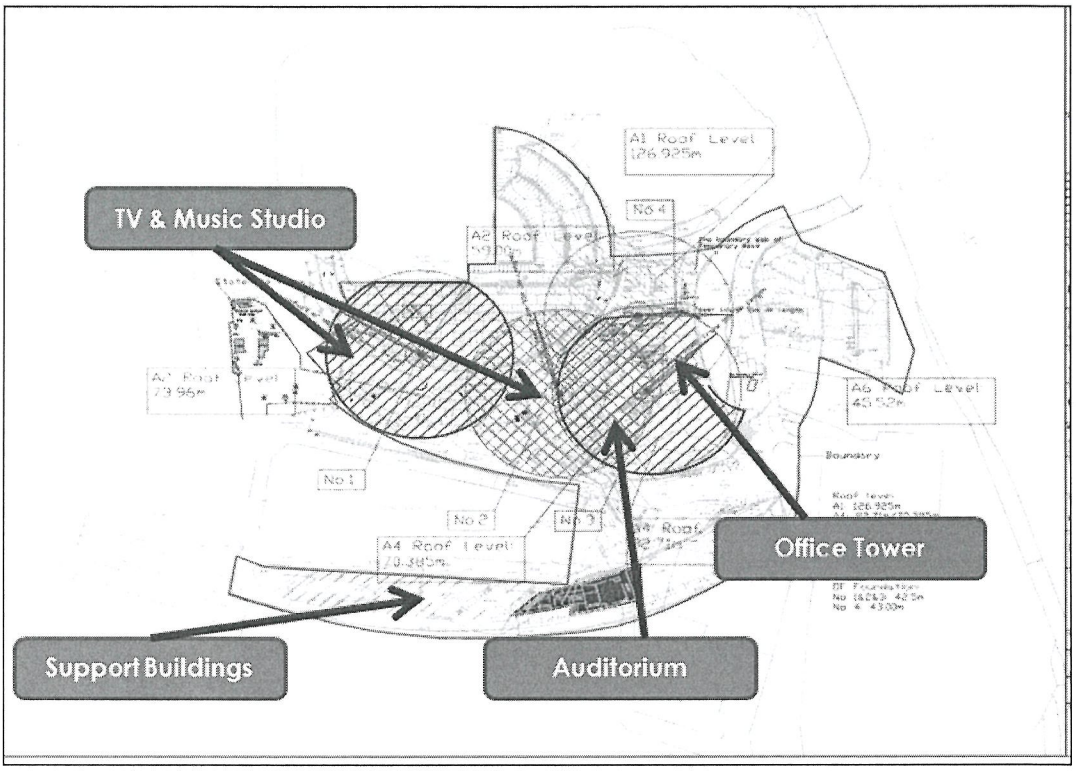

Figure 5 (C): Project A

- END OF QUESTIONS –

FINAL EXAMINATION

SEMESTER/SESSION : SEM II/2017/2018 PROGRAMME : 3 BNC
COURSE NAME : PLANT & MACHINERY COURSE CODE : BNC 31903

Production = CSVBE

1.0 m^3 BMC = 1.25 LCM = 0.9 CCM

Table 1 Ideal production of draglines

Type of Material	Bucket Size [cu yd (m^3)]										
	¾ (0.57)	1 (0.75)	1¼ (0.94)	1½ (1.13)	1¾ (1.32)	2 (1.53)	2½ (1.87)	3 (2.29)	3½ (2.62)	4 (3.06)	5 (3.82)
Light moist clay or loam	130 (99)	160 (122)	195 (149)	220 (168)	245 (187)	265 (203)	305 (233)	350 (268)	390 (298)	465 (356)	540 (413)
Sand and gravel	125 (96)	155 (119)	185 (141)	210 (161)	235 (180)	255 (195)	295 (226)	340 (260)	380 (291)	455 (348)	530 (405)
Common earth	105 (80)	135 (103)	165 (126)	190 (145)	210 (161)	230 (176)	265 (203)	305 (233)	340 (260)	375 (287)	445 (340)
Tough clay	90 (69)	110 (84)	135 (103)	160 (122)	180 (138)	195 (149)	230 (176)	270 (206)	305 (233)	340 (260)	410 (313)
Wet, sticky clay	55 (42)	75 (57)	95 (73)	110 (84)	130 (99)	145 (111)	175 (134)	210 (161)	240 (183)	270 (206)	330 (252)

*Based on 100% efficiency, 90° swing, optimum depth of cut, material loaded into haul units at grade level.

Table 2 Swing-depth factor for draglines

Depth of Cut (% of Optimum)	Angle of Swing (deg)							
	30	45	60	75	90	120	150	180
20	1.06	0.99	0.94	0.90	0.87	0.81	0.75	0.70
40	1.17	1.08	1.02	0.97	0.93	0.85	0.78	0.72
60	1.25	1.13	1.06	1.01	0.97	0.88	0.80	0.74
80	1.29	1.17	1.09	1.04	0.99	0.90	0.82	0.76
100	1.32	1.19	1.11	1.05	1.00	0.91	0.83	0.77
120	1.29	1.17	1.09	1.03	0.98	0.90	0.82	0.76
140	1.25	1.14	1.06	1.00	0.96	0.88	0.81	0.75
160	1.20	1.10	1.02	0.97	0.93	0.85	0.79	0.73
180	1.15	1.05	0.98	0.94	0.90	0.82	0.76	0.71
200	1.10	1.00	0.94	0.90	0.87	0.79	0.73	0.69