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Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
(ONLINE)
SEMESTER II
SESSION 2020/2021**

COURSE NAME : CONSTRUCTION PLANT
MANAGEMENT

COURSE CODE : BFP40203

PROGRAMME CODE : BFF

EXAMINATION DATE : JULY 2021

DURATION : 3 HOURS

INSTRUCTION : ANSWER ALL QUESTIONS

TERBUKA

THIS QUESTION PAPER CONSISTS OF SIX (6) PAGES

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- Q1** (a) There are three principle states of volume for soil moving at site may exist. Describe these **THREE(3)** states of soil moving volume with respect to the actual earthworks in highway construction project. (6 marks)
- (b) A total of 49 m³ of soil will be excavated and brought to the construction site for reclamation works. If the expansion factors for natural and loose state of soil are 1.0 and 1.29 respectively, answer the following questions.
- (i) Calculate the compaction factor of soil if compacted volume decreases for about 19% from natural state condition. (1 mark)
- (ii) Determine the number of lorries with loading capacity of 5 m³ that needed to transport a total amount of soil for reclamation work. (1 mark)
- (iii) Compute the percentage of swelling and shrinkage for the soil above (4 marks)
- (c) The effectiveness of the use of shovel is highly dependent on technical aspects. As an engineer who involved in earthworks for a construction project, suggest **FOUR (4)** technical approaches to shovel operators on how to improve the productivity of works which at the same time can reduce the cost of maintenance of shovel. (8 marks)
- (d) Explain **TWO (2)** principles force that are applicable to produce deep compaction of soil. (5 marks)
- Q2** (a) **Figure Q2(a)** shows the cross section for earthworks activities of highway construction project. The shaded region represents the portion of soil that needs to be cut and used for reclamation of low-level areas. Based on the information given in the figure, propose **FIVE (5)** types of machineries that are required for the earthworks activities until the formation of road embankment as shown in the figure. Your answer must include the function and **TWO (2)** effective approaches on how to increase the production of each machinery that you proposed. (20 marks)
- (b) There are a few important factors involved to achieve an optimum excavator and haul unit combination. Describe in detail **TWO (2)** of the important factors that mentioned above. (5 marks)

- Q3** (a) **Figure Q3(a)** shows the incident of a crane collapse at a construction site. Such incidents can result in loss of life, injury and property damage. Based on the information from the figure, answer the following questions.
- (i) Evaluate **FIVE (5)** primary causes of the incident. (10 marks)
- (ii) Compliance of standard operating procedure, either during installation or operation is important to avoid such incidents. Discuss **FIVE (5)** technical matters that are important to be considered before installing the tower crane. (10 marks)
- (b) Explain **FIVE (5)** safety inspection procedures that are need to be done before material or passenger hoists can be used. (5 marks)
- Q4** **Table Q4 (a)** and **Table Q4 (b)** show the relevant information for earthwork cost and production of the shovel. Based on these tables, answer the following questions.
- (a) Calculate the number of trucks are required to service the excavator for each type of truck. (8 marks)
- (b) Develop the cost comparison table to obtain the number of trucks that should be used to provide the lowest loading and hauling cost, if the similar shovel having bottom-down bucket type is used, swing angle is 75° and excavated material is common earth. (12 marks)
- (c) From your answer question **Q4 (b)**, calculate the probability that there will be a truck available for loading at any particular instant. (2 marks)
- (d) Based on the answer from **Q4 (c)**, recommend the most effective method that can be done to make sure the availability of truck at particular instant. (3 marks)

–END OF QUESTIONS–

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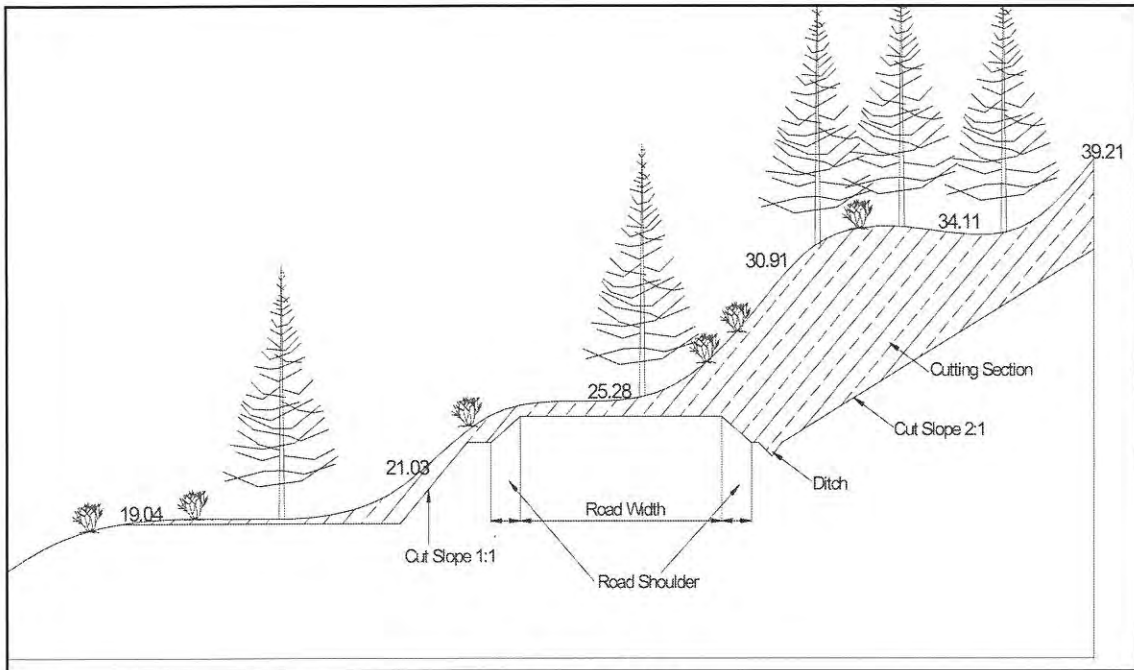


FIGURE Q2 (a)



FIGURE Q3 (a)

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TABLE Q4 (a)

Item		
Dipper load/ capacity: 2.4 LCM		
Bucket fill factor: 0.89		
Load Factor: 0.80		
Job efficiency: 0.91		
Dipper cycle time: 21 sec		
Rate: RM 120.00/hour		
Trucks:		
Size Truck (BCM)	Cost (RM/h)	Transit Time(h)
10	60.00	0.47
13.2	85.00	0.52

TABLE Q4 (b)

	Machine Size					
	<i>Small Under 5 yd (3.8 m³)</i>		<i>Medium 5-10 yd (3.8-7.6 m³)</i>		<i>Large Over 10 yd (7.6 m³)</i>	
<i>Material</i>	Bottom Dump	Front Dump	Bottom Dump	Front Dump	Bottom Dump	Front Dump
Soft (sand, gravel, coal)	190	170	180	160	150	135
Average (common earth, soft clay, well-blasted rock)	170	150	160	145	145	130
Hard (tough clay, poorly blasted rock)	150	135	140	130	135	125
Adjustment for Swing Angle						
	<i>Angle of Swing</i>					
	45	60	75	90	120	180
Adjustment factor	1.16	1.10	1.05	1.00	0.94	0.83

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TABLE Q4 (c)

Number of Haul Units													
<i>r</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	<i>11</i>	<i>12</i>	<i>13</i>	<i>14</i>	<i>15</i>
.01	.030	.040	.049	.059	.069	.079	.089	.099	.109	.119	.129	.138	.148
.02	.059	.078	.098	.117	.137	.156	.176	.195	.215	.234	.253	.274	.292
.03	.087	.116	.145	.174	.203	.231	.260	.288	.317	.345	.373	.401	.429
.04	.115	.153	.191	.229	.266	.304	.341	.378	.414	.450	.486	.522	.556
.05	.142	.189	.236	.282	.328	.373	.418	.462	.506	.548	.590	.631	.670
.06	.169	.224	.279	.333	.386	.439	.490	.541	.590	.637	.682	.726	.766
.07	.194	.258	.320	.382	.442	.501	.558	.613	.665	.715	.762	.804	.843
.08	.220	.291	.361	.429	.495	.559	.620	.678	.732	.782	.827	.866	.900
.09	.244	.323	.399	.473	.545	.613	.676	.736	.789	.837	.876	.911	.938
.10	.268	.353	.436	.515	.591	.662	.727	.785	.837	.880	.916	.943	.964
.11	.291	.383	.471	.555	.634	.706	.771	.828	.875	.914	.943	.964	.979
.12	.314	.412	.505	.593	.673	.746	.810	.863	.906	.939	.962	.978	.988
.13	.335	.439	.537	.627	.709	.782	.843	.892	.930	.957	.975	.987	.993
.14	.357	.465	.567	.660	.742	.813	.871	.915	.948	.970	.984	.992	.996
.15	.377	.491	.596	.690	.772	.840	.894	.934	.962	.979	.989	.995	.998
.16	.397	.515	.622	.718	.799	.864	.914	.949	.972	.986	.993	.997	.999
.17	.416	.538	.648	.743	.823	.885	.930	.960	.979	.990	.996	.998	
.18	.435	.560	.672	.767	.844	.902	.943	.969	.985	.993	.997	.999	
.19	.453	.581	.694	.788	.863	.917	.954	.976	.989	.995	.998		
.20	.470	.602	.715	.808	.879	.930	.963	.982	.992	.997	.999		