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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2026

M.Tech-II[nd] Semester (CE)

COURSE CODE (CREDITS): 10M11CE212(3) MAX. MARKS: 25

COURSE NAME: Heavy/Civil Construction Equipment, Methods, and Management

COURSE INSTRUCTORS: Dr. Amardeep MAX. TIME: 1Hour 30 minutes

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q.No	Question	CO	Marks
Q1	Make a detail discussion about the different types of pile foundation technique along with their application.		05
Q2	What are the different geological characteristics required to consider prior to the blasting? Discuss in detail.		05
Q3.	Please specify burden, stemming, length of bench height, hole depth and diameter. Discuss their importance and affects also.		05
Q4.	A crawler hoe having a ***3½-cy bucket*** is being considered for use on a project to excavate ***very hard clay*** from a borrow pit. The clay will be loaded into trucks having a ***loading height of 9 ft 9 in***. Soil- boring information indicates that below ***8 ft***, the material changes to an unacceptable silt material. What is the estimated production of the hoe in cubic yards bank measure, if the ***efficiency factor*** is equal to 50-***min/hour***?		05
Q5.	Discuss in detail about different types of soil compaction equipment's along with their application.		05

Table D-1 Fill factor for hydraulic Hoe (Caterpillar Inc.)

Table D-2 Excavation Cycle times for hydraulic crawler hoes under average condition

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Table D-3: Representative dimensions, loading clearance, and filling capacity, hydraulic crawler Hoe

Size bucket (cy)	Bucket length (ft)	Maximum digging reach @ ground level (ft)	Maximum digging depth (ft)	Maximum loading height (ft)	Lifting capacity at 10 ft: Short stick, Front (lb)	Short stick, Side (lb)	Long stick, Front (lb)	Long stick, Side (lb)
¾	6–7	19–22	12–15	14–16	2,900	2,600	2,900	2,600
1	6–9	24–27	16–18	17–19	7,100	6,300	7,200	5,900
1	6–13	28–33	16–23	17–25	12,800	9,000	9,300	9,200
1¼	6–13	27–33	17–21	18–23	17,100	10,100	17,700	11,100
2	7–11	29–36	16–27	19–24	21,400	14,500	21,600	14,200
2½	7–16	32–40	20–29	20–26	32,600	21,400	31,500	24,400
3	10–11	38–42	25–30	24–29	32,900*	24,800*	30,700*	26,200*
3½	8–12	36–39	23–27	21–22	33,200*	21,900*	32,400*	22,000*
4	11	44	29	27	47,900*	33,500*		
5	8–16	40–46	28–32	25–26	34,100†	27,600†	31,600†	27,600†

Table D-4 Swell factor

Material	Bank weight lb/cu yd	Bank weight kg/m³	Loose weight lb/cu yd	Loose weight kg/m³	Percent swell	Swell factor
Clay, dry	2,700	1,600	2,000	1,185	35	0.74
Clay, wet	3,000	1,780	2,200	1,305	35	0.74
Earth, dry	2,800	1,660	2,240	1,325	25	0.80
Earth, wet	3,200	1,895	2,560	1,525	25	0.80
Earth and gravel	3,200	1,895	2,600	1,575	20	0.83
Gravel, dry	2,800	1,660	2,480	1,475	12	0.89
Gravel, wet	3,400	2,020	2,980	1,765	14	0.88
Limestone	4,400	2,610	2,750	1,630	60	0.63
Rock, well blasted	4,200	2,490	2,640	1,565	60	0.63
Sand, dry	2,600	1,542	2,260	1,340	15	0.87
Sand, wet	2,700	1,600	2,360	1,400	15	0.87
Shale	3,500	2,075	2,480	1,470	40	0.71