

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

MID SEMESTER EXAMINATION-2015

M.Tech CM II Semester

COURSE CODE: 10M11CE212

MAX. MARKS: 30

COURSE NAME: Heavy/Civil Construction Equipment

COURSE CREDITS: 3

MAX. TIME: 2 HRS

Note: All questions are compulsory. Please attempt all questions in a section in continuation.

Section A**(Marks = 6. Each question is of 1 mark.)**

1. Construct labeled sketches to illustrate the following classifications of earthmoving equipment.
 1. Tractor-cum-swivel unit
 2. Frame with an articulation joint
2. A broad classification of compaction rollers is (I) Self-propelled (II) towed. By labeled sketches alone, present examples of each class.
3. What roller types will you select for the following soil types:
 1. Clean sand, gravel
 2. Silt, clayey silt
4. What roller types will you select for the following soil types:
 1. Clay
 2. Silty sand, silty gravel
5. What are Clamshells (Grabs) used for? Construct a neat sketch to demonstrate the working of a clamshell bucket.
6. Rollers cannot be used for compaction (a) in confined areas (b) close to rigid structures, and (c) near sharp corners. In such cases, small hand operated compactors must be used. Suggest an appropriate small compactor for (i) coarse-grained soils, and (ii) fine-grained soils. Construct a neat sketch for each type.

P.T.O.

Section B**(Marks = 9. Each question carries 3 marks.)**

1. 10 m^3 of undisturbed soil in a borrow area acquires a volume of 13 m^3 after excavation. When the soil is transported, spread and compacted, the volume becomes 8 m^3 . Compute the percentage swell, S_w , and the percentage shrinkage, S_h .
2. List various equipments used as excavators. Describe with a neat sketch the dragline.
3. What is the equipment required in driving piles into the ground? Explain in detail the equipment used in protecting the head of a concrete pile during driving.

Section C**(Marks = 15. Each question carries 5 marks.)**

1. A dozer with a blade capacity of 3 m^3 has to strip soil that has a swelling factor of 25% in thin horizontal layers for a distance of 50 m. The dozer's forward speed is 2 km/hr and return speed is 5 km/hr. In each cycle it consumes a fixed time of 0.4 minutes for shifting gears, adjusting blade, etc. Compute the output of the dozer in m^3/hr (bank measure).
2. Compute the output in m^3/hr (bank measure) of a shovel with 1.5 m^3 bucket capacity having a cycle time of 30 seconds. The soil has a swell factor of 20%. If the shovel is filling a dumper of 9.0 m^3 capacity and 2 minutes are lost for positioning (spotting) of the dumper after each loaded dumper moves, what will be the effect on the output?
3. A road embankment having top width of 8 m, height of 3 m, length of 2.5 km and side slopes of 1.5 horizontal to 1 vertical is to be constructed using 6 passes of vibratory rollers that have a width of 1.8 m and a velocity of 2 km/hr. Rollers will work 8 hrs/day. Each compacted layer has a thickness of 0.45 m. The work has to be completed in 1 month.
 - (a) Estimate the minimum number of rollers required to complete the job.
 - (b) How many rollers will be required if the rollers cannot function continuously but remain idle for 40% of the time when soil spreading, water spraying and mixing operations of each layer are undertaken.