B.Tech. Civil (Construction Management)/ B.Tech. Civil (Water Resources Engineering)

Term-End Examination

December, 2006

ET-581(F) : MECHANICAL EQUIPMENT IN CONSTRUCTION

Time : 3 hours *Maximum Marks : 70*

Note :

(i) *Attempt any **seven** questions.*

(ii) *All questions carry equal marks.*

(iii) *Use of calculator is allowed.*

1. (a) What are the various costs considered in evaluating the economic life of an equipment ?

(b) What effects do depth of cut and angle of swing have on the output of draglines ? How do the size of bucket and the length of boom affect the output of a dragline ? *2×5=10*

2. (a) How are bucket excavators classified ? How is the theoretical output of a bucket excavator assessed ?

(b) What is a grid roller and for what type of soil is it best suited ?

2×5=10

3. (a) How is mass concrete defined ? What are the normal construction practices to lower the placement temperature of concrete ?

(b) Why do you require delay detonators ? Where are delay detonators used ? What are electric detonators ? How are they advantageous over other types of detonators ?

2×5=10

4. (a) Describe the mechanism of a scraper and its operation. Under what soil and valley conditions is the use of a scraper justified ?

(b) Describe the different types of dumpers used on construction jobs. How are dumpers different from trucks ?

2×5=10

5. (a) Discuss the radial gates provided on spillways.

(b) What is the purpose of using concrete vibrator ? Describe the different types of concrete vibrators.

2×5=10

6. A batch of concrete mix for mass concrete includes the following ingredients :

Ingredients	Batch weight (kg)	Specific heat	Initial temperature °C
Cement	95	0·28	44·00
Sand	355	0·25	26·00
Gravel	1673	0·23	4·00
Water	38	1·00	2·00
Free moisture in sand	10·60	1·00	26·00
Free moisture in gravel	17	1·00	4·00
Ice	?	0·50	— 4·00

If the desired temperature for placement is 10° C, what should be the quantity of ice to be added to the batch ? Assume 3° C rise due to mixing operations. *10*

7. A construction machine costs Rs. 96,000 and has an expected life of 6 years and salvage value of Rs. 6,000. It is expected to work 2500 hours in a year. Compute the yearly depreciation for the machine using

(i) Straight line, and

(ii) Sum of the years' digit method *10*

8. Determine the quantity of material compacted if the sheep's foot roller travels at 6 km/hr, time of rolling is 50 minutes, length of drum 4·0 m, number of drums 2, fraction of overlap $\frac{1}{5}$, layer thickness 0·5 m, and the number of passes given are 10. *10*

9. A 2·4 m^3 re-handling type bucket is used to transfer sand from a stockpile into a hopper 12 m above the ground. The angle of swing is 90°. The average speed of hoist line is 3·2 km/hr. Determine the probable output per hour. *10*

Assume : Time per cycle (Approx.)

Loading bucket = 10·0 sec.

Dumping bucket = 10·0 sec.

Swinging bucket to stockpile = 7·0 sec.

Loss time, accelerating etc. = 7·5 sec.

Unit operates : 50 minutes per hour

10. Write short notes on any ***five*** of the following : *5×2=10*

(a) Book value of an equipment

(b) Butterfly valve

(c) Bench Blasting

(d) Back hoe

(e) Escalator

(f) Derrick crane

(g) Clamshell

(h) Job and management factor