

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

00515

Term-End Examination

June, 2010

**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 permitted.*

1. (a) Compare the mechanism and operation of the power shovel and the dragline. Under what conditions is each machine best suited ? **2x5=10**
- (b) What principal types of dump trucks are used on heavy construction ? Compare the rear dump and bottom dump trucks.
2. (a) What are the advantages of using belt conveyors for the transport of concrete aggregate in large quantities ? **2x5=10**
- (b) A construction machine costs Rs. 45,000 has a salvage value of Rs. 5,000 and an expected life of 5 years. Compute the yearly depreciation for the machine using :
 - (i) double declining method, and
 - (ii) sinking fund method (Take $i=0.12$).

3. (a) What are the various components of cost which are considered in evaluating the economic life of a construction equipment ?
- (b) Describe the various types of dredges in brief. **2x5=10**
4. (a) What are the various types of cranes ? Explain briefly working of each crane. **2x5=10**
- (b) Determine the lifting capacity of a crawler crane, given that :
- Total weight of crane without boom $W = 50 \text{ t}$
 Total weight of boom and supporting tackle $B = 4 \text{ t}$
 Weight of load falls, $P = 2 \text{ t}$
 Radius of lifting, $R = 16 \text{ m}$
 Fulcrum distance, $f = 3.6 \text{ m}$
 Distance of centre of gravity of machine from centre line of rotation, $g = 2.4 \text{ m}$
 Distance of boom hinge from centre line of rotation, $a = 2 \text{ m}$.
5. (a) Describe the tilting, non-tilting and pan type concrete mixers. **2x5=10**
- (b) Determine the quantity of material compacted by a sheep foot roller if it travels at 4 km/hr, time of rolling is 40 minutes, length of drum is 2.8 m, number of drum is 1, fraction of overlap is 15%, layer thickness is 0.4 m, and the number of passes specified is 6.

6. (a) Discuss the consideration to choose an appropriate type of equipment on excavation work. 2x5=10

(b) A batch of concrete mix for mass concrete includes the following ingredients :

Ingredients	Batch weight (kg)	Specific heat	Initial Temperature (°C)
Cement	100	0.30	45.00
Sand	360	0.26	27.00
Gravel	1700	0.24	5.00
Water	45	1.00	3.00
Free moisture in sand	10.60	1.00	26.00
Free moisture in gravel	19	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.

7. (a) Describe briefly the uses of bulldozers in a project. 2x5=10

(b) What is the purpose of providing gates on spillways ?

8. (a) What is post - cooling concrete ? How is it achieved ? What are the components of post - cooling system ? 2x5=10

- (b) A 3.0 m^3 re-handling type bucket is used to transfer sand from a stockpile into a hopper 16 m above the ground. The angle of swing is 90° . The average speed of hoist line is 3.6 km/hr. Determine the probable output per hour.

Assume : Time per cycle (Approx.) :

Loading bucket = 10.00 sec

Dumping bucket = 10.00 sec

Swinging bucket to stock pile = 8.0 sec

Loss time, accelerating etc. = 6 sec.

Unit operates : 50 minutes per hour.

9. (a) How are bucket excavators classified ? How is the theoretical output of a bucket excavator assessed ? 2x5=10
- (b) What are the different types of drilling jumbos used in tunnel construction ?
10. Write short notes on *any five* of the following : 5x2=10
- (a) Cable ways
 - (b) Clam shell
 - (c) Back hue
 - (d) Book value of an equipment
 - (e) Excalator
 - (f) Bench blasting
 - (g) Swell factor.