

College of Engineering, Pune
End-Semester Exam – November 2011
F.Y. M.Tech (Civil Construction and Management)
CM-501- Construction Equipment and Management

Day & Date- Wednesday 23rd November 2011
 Maximum Marks: 100

Time: - 4.00 to 7.00 pm
 Duration – Three hrs.

Instructions

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Neat figures must be drawn where necessary.

Q. 1

Hindi Constructions is proposing to procure Bull Dozers of same capacity, facilities and attachments from two Companies C1 and C2. Based on the data given below recommend the best option for the company using the present worth method of comparison. Assume return on investment by the company as 15%. Give reasons for your recommendations along with per hour usage charges for the equipment. You may use formats given.

(20)

Sr. No.	Details	Company C-1 Model - M11	Company C-2 Model - M22
1.	Show room price of basic equipment	20,17,000	21,49,000
2.	Cost of additional mandatory accessories	1,55,000	1,75,000
3.	Cost of dispatching at site on ownership cost	0.5%	Nil
4.	Cost of storage (annually on ownership cost)	0.75 %	0.75 %
5.	Fuel & oil (cost per year of book value)	3% + increase of 2% per year	3% + increase of 2% per year
6.	Taxes on equipment ownership cost	1.5% per year	1.5% per year
7.	Annual Maintenance cost		
	Year 1	20,000	22,000
	Year 2	22,000	23,000
	Year 3	23,000	24,000
	Year 4	24,000	25,000
	Year 5	25,000	26,000
	Year 6	26,000	27,000
	Year 7	27,000	28,000
8.	Annual insurance based on the book value (depreciation calculated by sum of the digits method)	4% of Salvage value	4% of Salvage value
9	Operator's salary including fringe benefits for 8 hours shift. (increases with inflation)	400 Rs. Per day	400 Rs. Per day
10.	Useful life as per manufacturer	7 years	7 years
12.	Total hours of operation per year	2,500 hours	2,500 hours
13.	Company may have to run machine with overtime shift for 80 days in a year for 20 hours.	Rs. 50 per additional hour of work	Rs. 50 per additional hour of work
14.	Salvage value of the equipment based on 7 th years depreciated cost	1.5%	1.5%
15	Inflation rate (increases at 1.5% per year after two years)	10% for first two years	10% for first two years
16	Minimum profit expected by the company	20%	15%

Q. 2 (a) To obtain a higher profit from earthwork using scraper, a contractor must organize and operate the spread in a manner that will ensure maximum production at the lowest cost. Enlist the methods by which this objective can be attained and explain any one of them. **(05)**

OR

(a) Determine the minimum size single deck screen, having 1-1/2 inch-square opening, for screening 150 tph of dry crushed stone, weighing 100lb per cf when crushed. The screen box is 4 ft wide. A screening efficiency of 85% is satisfactory. An analysis of the aggregate indicates that approximately 20% of it will be less than 3/4 inch in size. **(05)**

(b) Draw a neat diagram with appropriate labels of a piston type concrete pump. **(05)**

(c) You are planning to set up a crushing plant for supply of aggregates of different sizes and crushed sand as there is increasing demand in Pune city. To convince the funding agency you have to submit a neat flow diagram of the plant which you wish to setup along with various technical details such as capacity, type of crusher, movement of material, stock piles for production and backup if quarry material is not available. You have your own quarry in Wagholi area which can provide you good quality of stone for at least 10 years. Prepare your proposal. **(10)**

Q.3 (a) State the factors based on which individual tower cranes are selected for use. **(10)**

(b) Napoleon Construction Company has determined that the heaviest load to be lifted on one of their projects weighs 22,000 lb. From the tower crane location on the building site, the required reach for this lift will be 90 ft. The crane is equipped with an L7 jib and a four-part hoist line. This critical lift is of mechanical equipment and will require a 1000 lb spread bar attached to a 200 lb set of slings. Later on work site due to some changes, it was found that the actual required reach for this lift will be 100 ft. If assembled in the proposed and new configuration, can the crane safely make the pick ? **(10)**

Q. 4 (a) Holes are drilled for various purposes, such as to receive charges of explosives, for exploration, or for ground modification by the injection of grout. Enlist the factors which affect the selection of equipment. **(10)**

(b) All blasting operations should be carefully planned. State the issues that should be considered in the plan. **(10)**

Q.5 (a) Two asphalt plants produce 438 tons each per hour. A project with two lanes of width 12 feet each require paving with a 2-inch lift averaging 118 lb per sy-inch. What average paver speed will match the plant production ? How many 20-ton bottom dump trucks will be required if the total hauling cycle time is 50 min ? **(05)**

(b) Differentiate between the two **only with neat labeled figures (any three)** : **(15)**
 i) Bull dozer and loader.
 ii) crawler crane and tower crane
 iii) scraper and grader
 iv) drag line and back hoe

Year	Depreciation Ratio	Yearly Depreciation For C-1	Book Value of Equipment C-1	Yearly Depreciation For C-2	Book Value of Equipment C-2

Book Value for Equipment	Storage cost @0.75% on Ownership	Fuel and Oil cost @ 3% and increase of 2% per	Taxes @1.5%	Insurance @ 4%	Operator wages	Operator wages	Overtime	Annual maintenance with increase of 1.5% over 10% after 2 years	Inflation on maintenance	Total Expenses	Profit @20%	Total Expenses per year	Cost per hour for company
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Table-01 Efficiency factors for aggregate screening

Permissible screen efficiency %	Efficiency factor
95	1.00
90	1.25
85	1.50
80	1.75
75	2.00

Table-02 Deck factors for aggregate screening

For deck number	Deck factor
1	1.00
2	0.90
3	0.75
4	0.60

Table-03 Aggregate size factors for screening

Percent of aggregate less than 1/2 the size of screen opening	Aggregate size factor
10	0.55
20	0.70
30	0.80
40	1.00
50	1.20
60	1.40
70	1.80
80	2.20
90	3.00

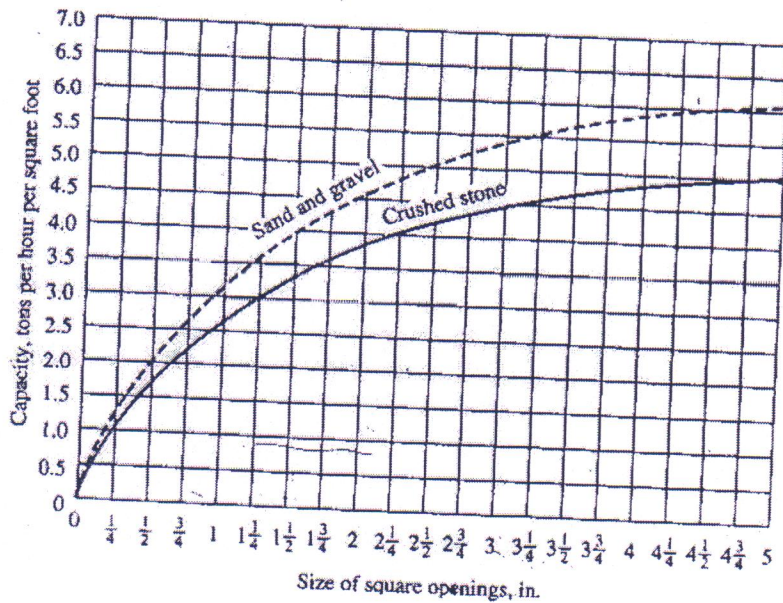
Table-04 Lifting capacity in pounds for tower crane

Job model	L1	L2	L3	L4	L5	L6	L7	Hook Reach
Maximum reach	100' 9"	119' 9"	138' 9"	157' 9"	176' 9"	195' 9"	214' 9"	
Lifting capacities in pounds, four-part line	55,200	55,200	55,200	55,200	55,200	55,200	55,200	13' 6"
	55,200	55,200	55,200	55,200	55,200	55,200	55,200	48' 9"
	55,200	55,200	55,200	55,200	55,200	55,200	51,400	51' 0"
	55,200	55,200	55,200	55,200	55,200	51,500	48,500	53' 6"
	55,200	55,200	55,200	55,200	51,300	48,300	45,600	56' 6"
	55,200	55,200	55,200	50,700	47,100	44,600	42,100	60' 6"
	46,200	46,200	46,200	42,800	39,700	37,400	35,200	70' 0"
	39,400	39,400	39,400	36,500	34,100	31,900	29,900	80' 0"
	34,600	34,600	34,600	31,900	29,700	27,700	26,100	90' 0"
	30,700	30,700	30,700	28,200	26,100	24,100	22,600	100' 9"
		27,800	27,800	25,600	23,600	21,700	20,300	110' 0"
		25,400	25,400	23,200	21,300	19,600	18,300	119' 9"
			23,100	21,100	19,300	17,700	16,400	130' 0"
			21,300	19,400	17,800	16,300	15,100	138' 9"
				17,600	16,200	14,700	13,600	150' 0"
				16,400	15,100	13,800	12,700	157' 9"
					13,600	12,400	11,400	170' 0"
					12,900	11,800	10,800	176' 9"
						11,500	10,600	180' 0"
						10,700	9,800	190' 0"
					10,200	9,300	195' 9"	
						9,100	200' 0"	
						8,300	210' 0"	
						8,100	214' 9"	

Table-05 Factors of 15% interest

Year or period (n)	$(1+i)^n$ Compound amount of a single sum	$\frac{1}{(1+i)^n}$ Present value of a single sum	$\frac{(1+i)^n - 1}{i}$ Compound amount of a uniform series	$\frac{i}{(1+i)^n - 1}$ Sinking fund deposit	$\frac{(1+i)^n - 1}{i(1+i)^n}$ Present worth of a uniform series	$\frac{i(1+i)^n}{(1+i)^n - 1}$ Capital recovery
1	1.1500	0.86956	1.000	1.00000	0.8695	1.15000
2	1.3224	0.75614	2.149	0.46511	1.6257	0.61511
3	1.5208	0.65751	3.472	0.28797	2.2832	0.43797
4	1.7490	0.57175	4.993	0.20026	2.8549	0.35026
5	2.0113	0.49717	6.742	0.14831	3.3521	0.29831
6	2.3130	0.43232	8.753	0.11423	3.7844	0.26423
7	2.6600	0.37593	11.066	0.09036	4.1604	0.24036
8	3.0590	0.32690	13.725	0.07285	4.4873	0.22285
9	3.5178	0.28426	16.785	0.05957	4.7715	0.20957
10	4.0455	0.24718	20.303	0.04925	5.0187	0.19925

Figure-01 Screen capacity chart



COLLEGE OF ENGINEERING
(Formerly Government College of Engineering, Pune)

END-SEM EXAM: 2011-12: Semester I

Construction Safety and Human Resource Management in Construction

F.Y. M. Tech – CIVIL (Construction & Management)

Day & Date- Monday 21/11/2011
Timing - 04.00 pm – 07.00 pm

Max. Marks- 50
Duration - 3.00 hrs

Instructions:

1. All questions are compulsory.
2. Answers to two sections must be written on **two separate answer books.**
3. Figures to the right indicate full marks.
4. Draw neat diagrams wherever required.
5. Assume suitable data if required and mention it clearly.

<u>SECTION - I</u>		Marks
Q. 1	Discuss various accident theories.	(05)
Q. 2	Explain various costs associated with the accidents.	(05)
Q. 3	Discuss fire safety in the buildings.	(07)
Q. 4	Design a safety program for a tunneling project and also discuss the cost aspect of it.	(08)
<u>SECTION - II</u>		
Q.5	Prepare training program for site engineer and Construction Manager.	(05)
Q.6	What is Performance Appraisal? Discuss the different methods of Performance Appraisal.	(07)
Q.7	“Manpower planning is the process of estimating the requirement of manpower”. Explain this statement by giving process of manpower planning in detail.	(05)
Q.8	Write a note on	(08)
	i) Career Planning	
	ii) Change Management	

COLLEGE OF ENGINEERING, PUNE –5
(An Autonomous institute of Govt. of Maharashtra)

End Semester Examination

(CE 5203) CONSTRUCTION MATERIALS AND MATERIALS MANAGEMENT

Programme : M.Tech. Civil (C&M) [First Year]

Year: 2011-12
Duration: 3 Hrs

Date: 19/ 11/ 2011
Max. Marks: 50

Instructions:

1. Attempt all questions.
2. Assume suitable data whenever required and mention it clearly.
3. *Figures to right indicate full marks*
4. *Draw neat figures wherever required*

Q.1. Answer the following :

- a) Explain in detail any two latest materials used in market for waterproofing of concrete terraces. (05)
- b) Enlist various types of grouting materials used for various structures. Explain in short the construction process of grouting for any two materials used in tunnel construction. (05)

Q.2. Bitumen is one of the most important but costly material in flexible road construction. Describe the quality checks to be performed on bitumen and bituminous road prior to construction and during construction. (10)

Q.3. Explain various types of advanced formwork systems in :
a) Tall concrete buildings
b) Tall concrete chimney construction
c) Atomic reactor construction
d) Tunnel shotcreting of 150mm thick for a length of 5km.

Importance should be given for materials used for construction. Assume suitable data if required. (10)

Q.4. A water retaining structure of 30m base width and 12m height of embankment is formed with deposition of disintegrated soft weathered rock with proper compaction. As an In-Charge of the project suggest and explain any two tests to be performed EACH in laboratory and on field so that proper quality control is achieved. (10)

Q.5. Answer the following :

- a) Explain with the help of an example the decision regarding EOQ in case of discounted offers by the suppliers. (03)
- b) Explain with sketches any two cases in which the process is at halt because of supply and demand imbalance of material in an industry. (03)
- c) Explain all steps involved in ABC analysis. What results are drawn from the analysis and how is it interpreted to resolve problems on site. (04)

College of Engineering, Pune
End-Semester Exam – November 2011
F.Y. M.Tech (Civil Construction and Management)
IS-501- Probability and Data Analysis

Day & Date- Friday 25th November 2011
 Maximum Marks: 100

Time: - 4.00 to 7.00 pm
 Duration – Three hrs.

Instructions

1. Solve **any Five** Questions.
2. Figures to the right indicate full marks.
3. Statistical tables will be provided only on request.

- Q.1** **A]** It was observed in the first Indian Metro railway construction project in Kolkata (1980) that there was unusual SPM (Suspended Particulate matter) concentration level between 6 hrs till 22hrs pm at the air quality monitoring station located in Esplanade area. You are expected to plot the data using one of the smoothing methods. Also, comment on the results. The results are expressed: Time in hrs (first row), and SPM concentration (second row) in $\mu\text{g}/\text{m}^3$: **(10)**

6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
8	14	60	1520	1460	1290	1000	300	100	90	80	1800	1600	1540	100	50

- B]** 31 observations (in units) refer to censored values below 6. **(10)**
 <MDL* <MDL <MDL <MDL 6.1 6.3 6.3 6.7 6.9 7.2 7.3 7.4 7.5 7.6
 7.7 7.8 7.9 8.0 8.1 8.3 8.5 8.7 8.9 9.4 9.6 10.1 9.0 7.0 8.8 6.7
 6.2

*Method Detection Limit
 Compute appropriate mean value.

- Q.2** **A]** A large portion of contaminated soil samples (expressed in units) was collected and divided into 32 identical aliquots and were sent to *four laboratories* for testing. Are laboratories making consistent measurements? **(10)**

Lab1	26.1	21.5	22.0	22.6	24.9	22.6	23.8	23.2
Lab2	18.3	19.7	18.0	17.4	22.6	11.6	11.0	15.7
Lab3	19.3	13.9	15.7	18.6	19.1	16.8	25.5	19.7
Lab4	30.7	27.3	20.9	29.0	20.9	26.1	26.7	30.7

- B]** Explain (**any three**) **(10)**
1. Rank Order and Karl Pearson's sample correlation coefficient
 2. Lukring variables and Happenstance data
 3. ANOVA and student t test
 4. Stratified sampling

- Q.3** **A]** Briefly describe the types of statistical distributions **(10)**

- B]** AFCON engages a pumping system for dewatering purpose at one of their sites. Assuming uninterrupted power supply, the following three sub systems must work for the Pumping System (PSys) to be functional: 1. The pumps (P), 2. Electric motors (EM), and 3. Pipe lines (PL). **(10)**

From the manufactures data , these subsystems are known to have probability of failure over the time period of interest and at the reactor operating conditions of $Pr(P)=0.02$, $Pr(EM)=0.04$ and $Pr(PL) 0.01$ and are known as marginal probabilities. What is the probability that it was the EM that failed during reactor operation (based on a test program)? Suppose we learn that:

- When P fails /PSys fails with $p=0.10$:
 - When EM fails /PSys fails with $p=0.15$:
 - When PL fails /CMS fails with $p=0.10$:
- [Known as conditional probabilities]

Q. 4 A] Compute appropriate mean value for the data set and estimate the outlier. Please (10) mention logical assumptions, if any

Parameter	Jan	Feb	Mar	April	May	June	July	August
BOD(mg/l)	25.0	2.0	5.0	40.0	10.0	12.0	18.0	15.0
Velocity (m/s)	0.8	1.0	1.2	0.7	0.9	1.1	1.3	1.4

B] The attack rate of small pox among the vaccinated against the not vaccinated are given (10) below. Prove the protective value by χ^2 - test.

Group	Result		Total
	Attacked	Not Attacked	
Vaccinated	10	30	40
Not vaccinated	10	70	80

Q. 5 A] Monthly salaries of employees in a large construction management firm are approximately (10) normally distributed with a mean of Rs.50,000 and a standard deviation of Rs.20,000.

- a) What percent of people earn less than Rs40,000?
- b) What percent of people earn between Rs 45,000 and Rs 65,000?
- c) What percent of people earn more than Rs 70,000?

B] PCMC has embarked upon a plan of installing universal water metering without (10) ascertaining the status of over 100,000 existing water meters. You are asked by the Commissioner to estimate the percentage of water meters which are out of order. In pilot study, it was observed that 20% of water meters are non functional. A sample survey needs to be carried out to achieve the desired objective.

Q. 6 The increase in traffic and narrow roads prompted Pune Municipal Commissioner to enforce a (20) speed limit of 40 km/hr for all the vehicles. In order to decide planning strategies, and enforcing traffic rules, one of the useful study on *violation of speed limit* was carried out by M. Tech students of Civil Engineering, COEP. In order to get a birds eye view of the problem, the students initially measured the speed of only 40 vehicles, randomly, and assumed that this data could follow normal population. First, express the observations as a Box Whisker Plot.

Data: (Speed in km/hr)

25, 20, 45, 80, 100, 25, 82, 32, 60, 62, 20, 22, 29, 24, 36, 18, 77, 52, 48, 47, 110, 35, 38, 82, 105, 18, 56, 102, 80, 19, 73, 24, 44, 30, 36, 35, 50, 42, 48, 54

The Municipal Authorities were keen to know about the speed violation. Calculate and justify the computational procedure. Also, suggest recommendations to PMC, if any.