



CEX7107 - Construction Productivity & Quantitative Techniques

FINAL EXAMINATION - 2015/2016

Time Allowed: Three Hours

Date: 2016 - 11 - 30 (Wednesday)

Time: 0930 - 1230 hrs

The paper has Six (06) questions. Answer any Four (04) questions.

Section A - Construction Productivity

Q1.

- i.) Work study involve two fundamental segments. Discuss these two segments and describe the basic stages involved in carrying out a method study including the utility of Multiple Activity Charts in the process.
(08 marks)
- ii.) Discuss the procedure involved in Work Measurement (Time Study) with particular reference to "rating" as defined in BS 3138. Specifically discuss the factors affecting the rating for typical construction operations.
(08 marks)
- iii.) Inclusive of how it could be adopted at a construction site, describe what is known as a 'Field Activity Count',. Discuss the possibility of deriving a relationship based on theories of statistics, relating the no. of observations for a given confidence limit reflecting a certain accuracy.
(09 marks)

Q2.

- i.) Describe the way of conducting a 'Forman Delay Survey' which is an effective way of finding general causes of delays in construction operations and discuss *five (05)* significant delay causes that should be queried in a forman delay survey form.
(08 marks)
- ii.) Clearly differentiate between **Remuneration** and **Incentives**. Discuss, the *three (03)* broad areas of classification of incentives with rationale for application to different groups of employees.
(08 marks)
- iii.) Identify and describe the issues and strategic steps a Project Engineer attending as the Chairman at a project meeting has to keep in mind in advance so as to make the outcome of the meeting advantages to the project and improve the productivity.
(09 marks)

Q3.

- i.) Site and clearly describe *five (05)* significant factors that could affect the Productivity of a building construction site located in the close suburbs of Sri Jayawardenapura.
(08 marks)
- ii.) One of the most difficult operations faced by a Project Manager is managing his own time. Therefore, productivity of a Project Manager is significantly undermined by situations that can be described as 'Time Robbers'. Briefly describe *ten (10)* of the most significant such situations in the context of Sri Lankan construction industry.
(08 marks)
- iii.) Discuss the meaning of Negotiation and explain its importance in the context of construction industry, especially when it comes to disputes over time and cost overruns. Present a list of guidelines for the process to be effective.
(09 marks)



SECTION B - QUANTITATIVE TECHNIQUES

Q4. At a whole sale and retail outlet of a major local tile manufacturer, 30% of the customers come to buy homogeneous floor tiles, 45% want general ceramic floor tiles and 25% come for wall tiles. Of the customers wanting homogeneous floor tiles 35% are wholesalers, out of those wanting general ceramic floor tiles 65% are wholesalers while out of those wanting wall tiles 55% are wholesalers.

- i.) On any particular day what is the probability that the next customer is a wholesaler? (06 marks)
- ii.) On any particular day, what is the probability that the next customer is a wholesaler who has come to buy homogeneous floor tiles? (06 marks)
- iii.) Estimate the expected number who are retail customers out of the next 500 customers. (06 marks)
- iv.) If the next customers is a wholesaler, what is the probability that wall tiles are required? (07 marks)

Q5.

The total cost of production P (in Rs.) of a batch of prestressed railway sleepers N (no. of units) is expected in turn to be proportional to the no. of units. Practically incurred costs for sleeper batches 5 and 20 units have been obtained. A simple linear regression model was derived based on the gathered data for different batch sizes as $P = 46.5 N - 106.2$ with a coefficient of determination $r^2 = 0.88$

- i.) Compute the correlation coefficient. (06 marks)
- ii.) What is the expected change in cost associated with a one unit increase in the batch size? Also, evaluate the change in cost in reference to the reduction of batch size by 5 units. (06 marks)
- iii.) According to the equation $P = 46.5 N - 106.2$, when batch size is 2 units it indicates a negative cost of Rs. 13.80. Comment on this result and the cause for this. (06 marks)
- iv.) Considering the general trend, propose a non linear regression equation form, to be more accurate in predicting the relationship. (07 marks)

Q6. Side dimensions of 32 randomly selected square homogeneous porcelain floor tiles of 300 mm nominal size is given in the table below.

297	300	302	305	297	297	299	305	298	300	300	299	304	301	301	300
298	301	296	303	302	301	299	301	299	296	303	300	302	297	299	303

- i.) Compute the sample mean of the tile side dimension and interpret it. (04 marks)
- ii.) Compute the sample median of the tile side dimension. (04 marks)
- iii.) Compare the advantages & disadvantages of the measures of location computed in parts i.) and ii.) and comment on the relationship to the nominal size. (04 marks)
- iv.) Compute the sample variance of the tile side dimension. (04 marks)
- v.) Compute the mean absolute deviation of the side dimension of the tiles and interpret it. (04 marks)
- vi.) Compare the advantages & disadvantages of the measures of dispersion found in parts iv.) and v.). (05 marks)

