Ministry of higher education
Higher institute for engineering
and Technology
New Damietta
Course title: Quality assurance and reliability
No. of pages 3

Summer Semester (July 2018)
Midterm exam
Level five
Time allowed: 90 min
Full Mark: 20 Marks

Model Answer

تا كليد كورة

Question .1 [4Marks]

The terms "quality control" and "quality assurance" are not synonymous. There is a distinct difference between them both in meaning and purpose. While quality assurance is meant to prevent problems, quality control detects any problems that occur. Each one requires different skills, and separate departments in an organization are responsible for each aspect of the quality guarantee. Internationally recognized standards for both procedures come under the International Organization for Standardization (regulation ISO 9001:2008).

Quality assurance describes a process. The role of a quality assurance department is to devise procedures and systems in collaboration with other departments that ensure all deliverables are constantly of good quality. The deliverables may be factory-produced goods or a service; for example, quality assurance plays an important role in health services. Following the quality assurance process should guarantee that goods and services are flawless, and reduce management and employee time spent investigating complaints and reorganizing systems. Quality assurance is proactive in that it aims to prevent defects or problems from occurring. Management and third-party auditors are usually responsible for establishing quality assurance standards, checklists, relevant documentation and audits of internal processes.

Quality control describes a product-based approach rather than a process. In a product life cycle, it comes after the product is made and before it is delivered to customers. The quality control department checks that items conform to specific standards. If changes are necessary, the quality control personnel state what is needed. Compared with quality assurance, quality control is reactive, or corrective, in that it exists to identify defects and correct them. Quality control is usually devised and supervised by engineers and inspectors, particularly in a manufacturing environment.

Question .2 [3Marks]

Given P=0.2 ; n = 100

Required a) P(r=12) b) P(r=0) c) P(r≤5)

Answer:

Lot size is unknown P>.1 n> 100

Binomial distribution q=0.8

$$P(r)={}^{n}C_{r}P^{r}q^{n-r}$$

a) $P(12) = {}^{100}C_{12}\,(.2)^{12}(.8)^{88}=0.0127$ [1 Mark]

b) $P(0) = {}^{100}C_{0}\,(.2)^{0}(.8)^{100}=2.037 * 10^{-10}$ [1 Mark]

c) $P(r\leq5)=P(0)+P(1)+P(2)+P(3)+P(4)+P(5) =1.867\ 10^{-5}$ [1 Mark]

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Question .3 [8Marks]

Given $n = 5$; $K=25$, $A_2=0.58$ $d_2=2.326$ $D_3=0$ $D_4=2.11$
USL=14.8 LSL=14 $\sum x = 357.5$

Answer:

a) **R-chart** [2 Marks]

$CL=\bar{R}=\sum R/k=8.8/25=0.352$

$UCL=D_4\bar{R}=2.11*0.352=0.7427$

$LCL=D_3\bar{R}=0$

$\bar{\bar{X}}$ Chart

$CL=\bar{\bar{X}}=\sum \bar{X}/k=357.5/25=14.3$

$UCL=\bar{\bar{X}}+A_2\bar{R}=14.3+0.58)0.352=14.504$

$LCL=\bar{\bar{X}}-A_2\bar{R}=14.095$

b) Process capability =6 σ [2Marks]

$\sigma= =\bar{R}/d_2=0.352/2.326=0.15133$

Process capability=6*0.15133=0.9079

c) Comment : [2Marks]

USL-LSL=14.8-14=0.8

6 σ>USL-LSL

The process is not capable of meeting speciation limits

d) $UNTL=\bar{\bar{X}}+3\sigma=14.3+3)0.15133=14.75$ [2Marks]

$LNTL=\bar{\bar{X}}-3\sigma =13.84$

USL=14.8 LSL=14

$Z=LSL-\bar{\bar{X}}/ \sigma=14-14.3/0.15133=-1.98$

There is scrap (rejection)

P(z)= 0.0239

Percentage rejection 2.39%

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Question .4 [5Marks]

Z=X-μ/σ **μ=380)14.7=5586**

a) X=5000 X=6200 [1 Mark]
Z=5000-5586/840=-0.69 Z=6200-5586/840=0.73
From table P(-0.69)=0.2451 from table P(0.73)=0.7673
P(R between 5000 and 6200)=0.7673-0.2451=0.5222=52.221

b) X=3000 [1 Mark]
Z=3000-5586/840=-3.07
P9-3.07)=0.0011=0.9989=99.89%

c) P=0.3300 from table with P [3 Marks]
Z=-0.44
-0.44=2000-μ/840
M=2369.6

Best Wishes

Dr Eng. sameh Abdel-Hamed.