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**ASSIGNMENT SESSIONAL.**

# Q1.

# (a).

# Ans.

**MEAN AND VARIENCE:**

mean=Np=4

var Npq= 9

q=np/npq=4/9= 0.444 =q

now find p

p+q=1

p= 1-q

p= 1-0.444= 0.556

**p= 0.556**

now find n

np=4

put value of p

n*0.556=4

n= 4*0.556

**n=2.224**

**so p=0.556 and n= 2.224.**

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## (b)

## Ans.

**Critical Region:**

- A **critical region**, also known as the rejection **region**.
- **critical region** is a set of values for the test **statistic** for which the null hypothesis is rejected.

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### ( c)

### Ans.

### T distribution properties:

T distribution properties are followings:

- The mean of the **distribution** is equal to 0.
- The variance is equal to v / ( v - 2 ), where v is the degrees of freedom and v > 2.
- The variance is always greater than 1, although it is close to 1 when there are many degrees of freedom.

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### (d)

### ANS.

**Analysis of variance:**

- Analysis of variance is a statistical method that separates observed **variance** data into different components to use for additional tests. A one-way.
- Analysis of variance is used for three or more groups of data, to gain information about the relationship between the dependent and independent variables.

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**(e)**

**ANS.**

**RBD:**

- The randomized block design (RBD) may be used when a researcher wants to reduce the experimental error among observations of the same treatment by accounting for the differences among blocks.

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**(f)**

**ANS.**

**Statistical Quality control:**

- A branch of mathematical statistics, the methods of which are used in industry to determine the level of quality actually attained, the trends which affect it and its influence on the industrial process.

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(g)

ANS.

**Chance cause and Assignable cause**:

- **Chance cause:** A process that is operating with only **chance causes** of variation present is said to be in statistical control.

- **assignable cause** is an identifiable, specific **cause** of variation in a given process or measurement.

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**(h)**

**ANS.**

**traffic intensity:**

- A measure of the average occupancy of a facility during a specified period of time, normally a busy hour, measured in **traffic** units.
- It’s **defined** as the ratio of the time during which a facility is occupied (continuously or cumulatively) to the time this facility is available for occupancy.

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**(i)**

**ANS.**

**characteristics of queuing theory:**

- Exponential and Poisson Probability Distributions.
- The Input Process. To begin modeling the input process, we define itself as the time when the customer arrives.
- The Output Process. Much like the input process, we start analysis of the output process by assuming that service times of different customers.
- Birth-Death Processes. We define the number of people located in a queuing system, either waiting in line or in service, to be the state of the system at time t.
- Steady-state Probabilities.

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**Q2.**

**(a)**

**ANS.**

**Mean and variance of binomial distribution:**

In binomial distribution,
mean $=np$
and
variance $=npq$
Here given $np=4$
And
$npq=3$
So $q=43\Rightarrow$
$p=1-$**$p$=41**
**Thus $n$=16**
**Hence $P(X\geq1)=1-P(X=0)=1-16C0p0q16=1-(43)16$**

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**(b)**

**ANS.**

Let X denote number of cars hired out per day
Poisson distribution mean = m = 1.5
P(X=x)=(((e^−m)(m^x))/(x!))= (((e^−1.5)(1.5^x))/(x!))
1) P(neither car is used):
P(X=0)=(e^−1.5)(1.5^0)/0.2231
2) P(Some demand is refused ) = P(Demand is more than 2 cars per days)

P(x>2)
=1−P(x≤2)
=1−[P(x=0)+P(x=1)+P(x=2)]
=1−[((e^1.5)(1.5^0)/0!)+ ((e^1.5)(1.5^1)/1!)+((e^1.5)(1.5^2)/2!)]

=1−e^1.5[1+1.5+(2.25/2)]=0.1912

Proportion of days on which neither car is used = 0.2231 = 22.31 %

Proportion of days on which some demand is refused = 0.1912 = 19.12 %

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**Q3.**

**ANS.**

| Group No. | No. of defects | Group No. | No. of defects |
|---|---|---|---|
| 1 | 75 | 9 | 47 |
| 2 | 64 | 10 | 77 |
| 3 | 75 | 11 | 59 |
| 4 | 45 | 12 | 57 |
| 5 | 93 | 13 | 84 |
| 6 | 55 | 14 | 40 |
| 7 | 49 | 15 | 95 |
| 8 | 65 | - | - |

Total numbers of defects = 576

$\overline{C}$ = 576/15=38.4

UCL = $\overline{C}$ +3 √ $\overline{C}$

= 38.4+24.25= 62.9

LCL = $\overline{C}$ -3 √ $\overline{C}$= 14.15

The data of group numbers 4, 14 and 15 fall outside these control limits There for revised control limits.

**$\overline{C}$= 576-(93+40+92)/12= 57.25**

**Revised UCL = 57.25+3*7.932= 81.046**

**LCL = 57.25 – 23.796= 33.454.**

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