SUBJECT: FURTHER MATHEMATICS **CLASS: SSS3**

SCHEME OF WORK

WEEK	TOPIC
1.	**REVISION**
2.	**PROBABILITY DISTRIBUTION** Binomial Probability Distribution Poisson Probability Distribution
3.	**PROBABILITY DISTRIBUTION** (CONTINUATION) Normal Distribution Properties and Area z – Scores Application.
4.	**STATICS** Definition of Concepts Resultant of Two Forces Components Resolution of Forces
5.	**STATICS – CONTINUATION** Definition of Equilibrium and Condition of Equilibrium of Rigid Body Application of the Condition to Solve Problems Lami'sTheorem and Application
6.	**REVIEW OF WEEK 1 – 5**
7.	**STATICS – CONTINUATION**. Definition of Moment of a Force Principles of Moments Application of the Principle in Solving Problems
8.	**FRICTION.** Basic Concept Coefficient of Friction Forces Actingon a body.

REFERENCE TEXTBOOK
FURTHER MATHEMATICS PROJECT 3

WEEK TWO
PROBABILITY DISTRIBUTION

- BINOMIAL PROBABILITY DISTRIBUTION
- POISSON PROBABILITY DISTRIBUTON

Probability distribution deals with theoretical probability model based on the randomness of certain natural occurrences. The binomial and Poisson distribution are discrete distribution

BINOMIAL DISTRIBUTION
This arises from a repeated random experiment which has two possible outcomes.
The two possible outcomes of the random experiment are usually called success and failure.
Prob(success) = P, Prob(failure) = q
Since the two events are complementary, hence p+ q = 1 or p = 1-q, q = 1 – p
The probability of success or failure of an event is the same for each trials and does not influence the probability of success or failure of another trial of the same event.
:. Binomial distribution of n trails and r required outcome(s) is defined as :

$pr(x = r) = {}^nC_r P^r q^{n-r}$

when ${}^nC_r = \frac{n!}{(n-r)!\, r!}$.

The binomial distribution is suitable when the number of trials is not too large.

Example:
1. Find the probability that when two fair coins are tossed 5 times a head and a tail appear three times.
Solution:
Two fair coins = (HT, TH, TT, HH) = 4
Prob (a head and a tail) = $^2/_4$ = ½
i.e p = ½ , q = ½ (p + q = 1)
n = 5, r = 3.
:. $P(x = r) = {}^nCrp^rq^{n-r}$
$p (x = 3) = {}^5C_3 (½)^3 (½)^{5-3}$
p (x = 3) = 10 x $^1/_8$ x ¼ = $^{10}/_{32}$ = $^5/_{16}$
p (x = 3) = 0.3125.

2. It is known that 2 out of every 5 cigarettes smokers is a village have cancer of the lungs. Find the probability that out of a random sample of 8 smokers from the village, 5 will have cancer of the lungs.

Solution
Prob(a smoker has cancer) = $^2/_5$i.e p = $^2/_5$
Prob(a smoker doesn't have cancer) = 1 – $^2/_5$ = $^3/_5$
:. q = $^3/5$
n = 8, r = 5
$Prob(x = -5) = {}^8C_5 (^2/_5)^5 (^3/_5)^3$
$= 56 \times \frac{32}{3125} \times \frac{27}{125} = \frac{48384}{390625}$
Prob (x = 5) = 0.124.

EVALUATION

Find the probability that when a fair six-faced die is tossed six times, a prime number appears exactly four times.

POISSON DISTRIBUTION: The Poisson distribution is more suitable when the number of trials is very large and probability of successes is small. It is defined as:

$Pr(x) = \frac{\lambda^x e^{-\lambda}}{x!}$, x = 0, 1, 2, 3,

Where λ = np e = 2.718
P = probability of success, n = number of trials.

Example:
If 8% of articles in a large consignment are defective, what is the chance that 30 articles selected at random will contain fewer than 3 defective articles?

Solution
P = 8/100 = 0.08, n = 30
:. λ = np = 0.08 x 30 = 2.4.

Prob(fewer than 3) i.eprob((0) + prob (1) + prob (2)

Prob (x = 0) $= \frac{2.4^o \times e^{-2.4}}{0!} = 1 \times {}^{e-2.4}$

Prob(x = 1) $= \frac{2.4^o \times e^{-2.4}}{1!} = 2.4 \times e^{-2.4}$

Prob(x = 2) $= \frac{2.4^o \times e^{-2.4}}{2!} = 2.88 \times e^{-2.4}$

Prob(x <3) $= e^{-2.4} + 2.4 \times e^{-2.4} + 2.88 \times e^{-2.4}$
$= e^{-2.4} (1 + 2.4 + 2.88)$
$= e^{-2.4} \times 6.28.$

EVALUATION
The probability that a person gets a reaction from a new drug on the market is 0.001. If 200 people are treated with this drug. Find approximately, the probability that:
(i) exactly three persons will get a reaction
(ii) more than two person will get a reaction

Properties of Binomial and Poisson Distribution.

Binomial
It assigns probability to….