

(Write very clear)

Candidate's Number: 190407012

\*1st/2nd Semester Examination, 20...../.....2024 Session

Faculty: ENGINEERING Department: SYSTEMS ENGINEERING

Course Code: SSG 348

Course Title: Industrial engineering

(\*Cross out the word which does not apply)

## UNIVERSITY OF LAGOS

### INSTRUCTIONS TO CANDIDATES

1. Write legibly on both sides of the paper.
2. Begin each answer on a fresh page.
3. Write the number of the question at the top of each page.
4. Cross out rough works.
5. In your own interest you should enter in the space provided below, the number of each question attempted (with sub-sections where necessary).
6. If supplementary books are used they must be fastened at the end of this book and inside the cover.
7. In no circumstances must answer books used or unused be removed from the Examination Room by a candidate.
8. Folding of, or tampering with this booklet in any way will attract severe penalty.
9. Do not write anything on your question paper except your matriculation number.
10. For your rough work, use only (a) the inside cover and (b) the last page of your answer booklet.

For Examiners use only	
Question No	Marks
1	09
3	10
2	08½
	25½
	27½
Total	

NUMBER OF QUESTIONS in order in which they  
are answered

1, 3, 2

(a)

#### 4 construct of industrial engineering

- i) work design & measurement
- ii) operation research and analysis
- iii) Ergonomics and human factors
- iv) supply chain management.

i) Work design & measurement: it is the process of designing and improving job to improve efficiency and worker's satisfaction. It uses time and motion studies to determine the most efficient way to perform a task and set a specific standard.

ii) operation research and analysis: it aims to optimize operation by using mathematical models, statistics and ~~and~~ algorithms to solve complex decision-making problems in the industry.

iii) Ergonomics and human factors: it focuses on designing system, processes and tools that are safe and efficient for human use. It considers human capabilities and ~~limitations~~ to improve comfort, productivity and safety of workers.

iv) supply chain management: it focuses of managing the supply of goods, information & services from suppliers to customers. It aims to optimize the supply chain by reducing cost, improving quality and timely ~~delivery~~ of products. to ensure customers satisfaction.

(e)

Three processes involved in quality management:

i) quality planning: it involves determining the quality standards that fit the project and determining how to implement it.

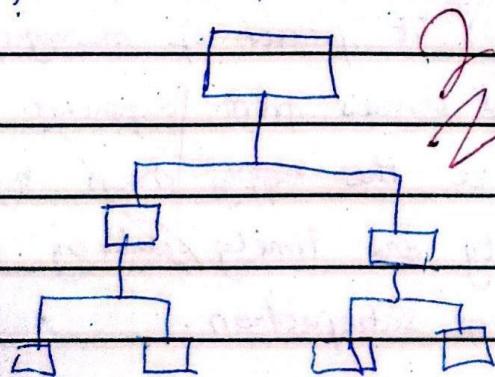
(b)

ii) quality assurance: it is the process of analysing the project to ensure it ~~can~~ meets the required quality standards.

iii) quality control: it is the monitoring the project methods to ensure that ~~it satisfies the required quality standards~~ the result satisfies the required quality standards while also improving ~~the~~ it.

(d)

Work breakdown structure is the splitting of work into different components:



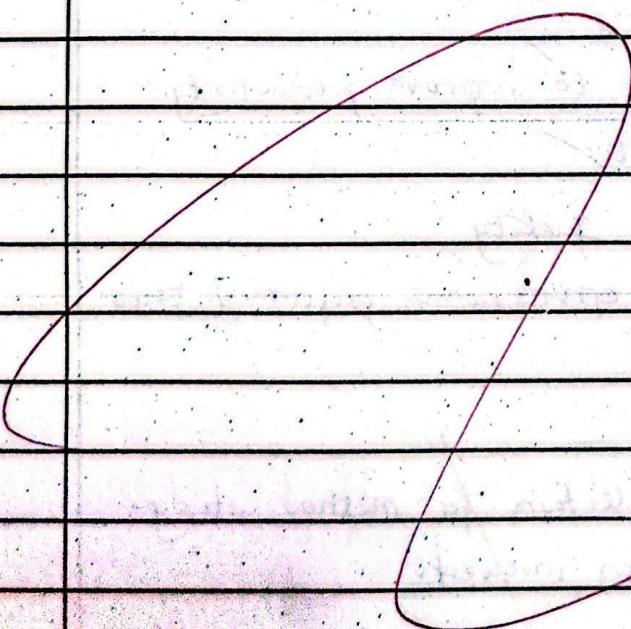
This diagram of work breakdown structure.

(b)

evolution of industrial engineering from Industry 1.0 to industry 5.0.

industrial engineering start from I-R 1.0 where our forefathers use primitive, crude tools to carry out tasks which then evolved to developing better tools to ~~carry out~~ <sup>and</sup> technology which leads us to our present I-R 4.0 where we're integrating digital technologies in manufacturing and industrial processes. Also industry 5.0 is a new and emerging phase where we can see humans working along side upcoming technologies and AI.

(q)



(b)

Method study is the process of analysing the ways of performing tasks and improving it so as to increase efficiency.

The steps involved are:

- i) select the task
- ii) record the task
- iii) examine the task
- iv) develop the method and define it
- v) install the method
- vi) maintain the method.

(c)

- i) To improve efficiency
- ii) Improving method study also aims to improve productivity.
- iii) It also helps minimize cost.
- iv) It also helps in improving quality.
- v) It also aims to reduce errors while performing tasks.

(d)

Things to consider in job selection for method study - we consider the time and motion involved.

To perform method study on a job, we consider the time that will be taken to perform it if it is ~~not feasible or not~~. Also we consider the motion or movement involved as this will help to know

what steps to take in the method study and things to look out for. If the time taken is too long, the method study will help to reduce find ways to reduce the time or this will also help to increase productivity and efficiency.

(a)

~~any quality costs refers to costs that ensuring required is involved in ensuring quality standards in products.~~

~~types of quality cost:~~

- ~~i) cost of conformance to quality (cost of good quality)~~
- ~~ii) cost of non-conformance to quality (cost of poor quality).~~

~~Examples of cost of conformance to quality~~

- ~~i) Appraisal cost~~
- ~~ii) prevention cost~~
- ~~iii) quality control~~

~~examples of cost of non conformance to quality~~

- ~~iv) scrap: under cost of non conformance we have internal cost failure cost.~~
- ~~v) warranty failure, and external Examples include: failure cost.~~
- ~~vi) litigation: i) scrap ii) warranty iii) litigation~~

(c)

~~i) Joseph Juran: he developed the quality trilogy which are quality planning, quality control & quality management~~

~~ii) Walter Edward Deming: also called the father he developed the 14 Deming principles and also the 7 deadly diseases of management~~

(ii) Phillip Crosby: he developed the ~~garbage principle~~ pareto principle

(v) Kaoru Ishikawa: he developed the fish-borne <sup>cycle</sup> diagram (also known as the Ishikawa cycle).

(B)

average processing rate = 100 batches per day.

batches for processing = 1500 batches.

100 batches  $\rightarrow$  1 day

1500 batches  $\rightarrow$  x

$$\begin{aligned} x &= 1500 \\ &\quad 100 \end{aligned}$$

$$= 15$$

$\therefore$  the processing time of 1500 batches is 15 days.

(a)

Quality costs refers to any cost that is involved in ensuring quality standards in products.

Types of quality cost:

- (i) cost of conformance to quality (cost of good quality).
- (ii) cost of non-conformance to quality (cost of poor quality).

Cost of conformance to quality

i) Appraisal cost e.g. i) quality planning ?

ii)

iii)

ii) Prevention cost e.g. i) quality control ?

ii) human resources ?

iii)

cost of non conformance to quality

i) Internal failure cost e.g. i) scrap

ii) rework.

iii) lit/gal/rep.

ii) External failure cost e.g. i) warranty

ii) litigation

iii) insurance

1/2