DIPLOMA EXAMINATION IN ENGINEERING /TECHNOLOGY

MANAGEMENT/COMMERCIAL PRACTICE-OCTOBER, 2018

INDUSTRIAL ENGINEERING

PART-A

1. **What is standard time**

   In industrial engineering, the standard time is the time required by an average skilled operator, working at a normal pace, to perform a specified task using a prescribed method.

2. **Explain SIMO chart.**

   SIMO (Simultaneous-Motion Cycle) Chart: Meaning, Method to Improve and Construction! "SIMO" stands for simultaneous-Motion Cycle chart. It is one of micro motion study devised by Gilbreth and it presents graphically the separable steps of each pertinent limb of the operator under study.

3. **Explain Functional inspection.**

   An inspection is, most generally, an organized examination or formal evaluation exercise. In engineering activities inspection involves the measurements, tests, and gauges applied to certain characteristics in regard to an object or activity. ... Inspections are usually non-destructive.

4. **What is depreciation?**

   Depreciation, i.e. a decrease in an asset's value, may be caused by a number of other factors as well such as unfavorable market conditions, etc. Machinery, equipment, currency are some examples of assets that are likely to depreciate over a specific period of time. Opposite of depreciation is appreciation which is increase in the value of an asset over a period of time.

5. **Explain about dispatching.**

   Dispatching. It refers to the control of processes of operation planning, giving operation order and controlling operations in

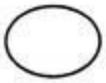
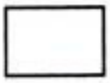
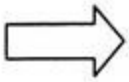
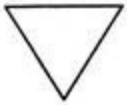
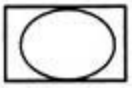
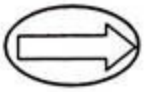
the manufacturing site. ... Its purpose is to improve the operability by properly controlling the capacity of delivery date management.

PART B

1. **List various activities of preplanning and explain each one.**

- Employee scheduling.
- Enterprise resource planning.
- Inventory control.
- Product planning.
- Project planning.
- Process planning, redirects to Computer-aided process planning.
- Sales and operations planning.
- Strategy.

2. **Draw the flow chart symbols and name the same**

Event/ Motion	Symbol	Explanation
Operation		Operation means an action. It is one of the steps in the procedure. Any operation for making, altering or changing the job is said to be an operation. Eg. Cutting and shaping the wood in the manufacture of furniture.
Inspection		It represents checking for quality and quantity of the items. Eg. Weight check or quantity check or hardness during drug preparations.
Transport		Movement or travel of workers or materials from one location to another. Eg. Steel rods being sent to machine shops from stores.
Delay or Temporary Storage		Delay means the process has stopped due to some reason. It is a temporary halt. Eg. Power failure or waiting for the lift.
Storage		It is the stage of a finished good or raw material waiting for an action. Eg. A finished product in a stock room.
Operation and Inspection		A product is being weighed when it is repacked. Eg. In an automatic process where a milk tin is weighed.
Operation cum Transportation		Products are made and ready for travel. Eg. Washing a product when it is being transported.

3. Explain the objectives of quality control

1. To establish the desired quality standards which are acceptable to the customers?

2. To discover flaws or variations in the raw materials and the manufacturing processes in order to ensure smooth and uninterrupted production.

3. To evaluate the methods and processes of production and suggest further improvements in their functioning.

4. To study and determine the extent of quality deviation in a product during the manufacturing process.

5. To analyse in detail the causes responsible for such deviation.

6. To undertake such steps which are helpful in achieving the desired quality of the product?

4. **List various causes of depreciation**

    1. Wear and tear. Any asset will gradually break down over a certain usage period, as parts wear out and need to be replaced. ...
    2. Perishability. Some assets have an extremely short life span. ...
    3. Usage rights. ...
    4. Natural resource usage. ...
    5. Inefficiency/obsolescence

5. **Explain need of improving productivity**

1. Developing Trust Among Employees:
2. Set Realistic Targets:
3. Follow Up the Set Targets:
4. Respecting Employees and Acknowledging their Performance:
5. Organizing Training Sessions from Time to Time:
6. Maintain connectivity with the Employees:

6 Explain about PMTS

A predetermined motion time system may be defined as a procedure/method which analyses any manual activity/human motion in terms of the basic or fundamental motions required to perform it. Each of these motions is assigned a predetermined or a previously established standard time value in such a manner those times for the

individual motions on addition provides a total time for the performance of the activity.

PMTS is a work measurement technique which comes next to synthetic times. They are more refined and accurate than the synthetic times because they are obtained gradually with more accuracy and often used as a source of synthetic time data.

7. **Explain about cost of quality and classify various parameters.**

   Cost of poor quality (COPQ): The costs associated with providing poor quality products or services. There are four categories: internal failure costs (costs associated with defects found before the customer receives the product or service), external failure costs (costs associated with defects found after the customer receives the product or service), appraisal costs (costs incurred to determine the degree of conformance to quality requirements) and prevention costs (costs incurred to keep failure and appraisal costs to a minimum).

   Cost of quality is a methodology that allows an organization to determine the extent to which its resources are used for activities that prevent poor quality, that appraise the quality of the organization's products or services, and that result from internal and external failures. Having such information allows an organization to determine the potential savings to be gained by implementing process improvements.

PART C

III (a) Explain different types of plant lay out

1. Product or Line Layout:

If all the processing equipment and machines are arranged according to the sequence of operations of the product, the layout is called product type of layout. In this type of layout, only one product of one type of products is produced in an operating area. This product must be standardized and produced in large quantities in order to justify the product layout.

The raw material is supplied at one end of the line and goes from one operation to the next quite rapidly with a minimum work in process, storage and material handling. Fig. 8.3 shows product layout for two types of products A and B.

2. Process or Functional Layout:

The process layout is particularly useful where low volume of production is needed. If the products are not standardized, the process layout is more low desirable, because it has creator process flexibility than other. In this type of layout, the machines and not arranged according to the sequence of operations but are arranged according to the nature or type of the operations. This layout is commonly suitable for non repetitive jobs.

Same type of operation facilities are grouped together such as lathes will be placed at one place, all the drill machines are at another place and so on.

3. Fixed Position Layout:

This type of layout is the least important for today's manufacturing industries. In this type of layout the major component remain in a fixed location, other materials, parts, tools, machinery, man power and other supporting equipment's are brought to this location.

The major component or body of the product remain in a fixed position because it is too heavy or too big and as such it is economical and convenient to bring the necessary tools and equipment's to work place along with the man power. This type of layout is used in the manufacture of boilers, hydraulic and steam turbines and ships etc.

4. Combination Type of Layout:

Now days in pure state any one form of layouts discussed above is rarely found. Therefore, generally the layouts used in industries are the compromise of the above mentioned layouts. Every layout has got certain advantages and limitations. Therefore, industries would to like use any type of layout as such.

Flexibility is a very important factory, so layout should be such which can be molded according to the requirements of industry, without much investment. If the good features of all types of layouts are connected, a compromise solution can be obtained which will be more economical and flexible.

(b) Explain principles of material handling

1.OrientationPrinciple

Study the system relationships thoroughly prior to preliminary planning in order to identify existing methods and problems, physical and economic constraints, and to establish future requirementsandgoals.

2.PlanningPrinciple

Establish a plan to include basic requirements, desirable options, and the consideration of contingencies for all material handling and storage activities.

3.SystemsPrinciple

Integrate those handling and storage activities which are economically viable into a coordinated system of operation including receiving, inspection, storage, production, assembly, packaging, warehousing, shipping and transportation.

4. UnitLoadPrinciple

Handle product in as large a unit loads as practical.

5. Space Utilization Principle

Make effective utilization of all cubic space.

6. Standardization Principle

Standardize handling methods and equipment wherever possible.

7. Ergonomic Principle

Recognize human capabilities and limitations by designing material handling equipment and procedures for effective interaction with the people using the system.

OR

IV (a) Explain in detail different types of scheduling technique.

- First-come, first-served scheduling (FCFS) algorithm.
- **Shortest** Job First Scheduling (SJF) algorithm.
- **Shortest Remaining time** (SRT) algorithm.

- **Non-preemptive priority Scheduling** algorithm.
- **Preemptive priority Scheduling** algorithm.
- **Round**-Robin Scheduling algorithm.

(b) Explain value engineering

Value engineering is the review of new or existing products during the design phase to reduce costs and increase functionality in order to increase the value of the product. The value of an item is defined as the most cost-effective way of producing an item without taking away from its purpose. Therefore, reducing costs at the expense of quality will simply be a cost-cutting strategy. With value engineering, cost reduction should not affect the quality of the product being developed or analyzed.

The concept of value engineering evolved in the 1940s at General Electric, in the midst of World War II. Due to the war, purchase engineer Lawrence Miles and others sought substitutes for materials and components, since there was a chronic shortage of them. These substitutes were often found to reduce costs and provided equal or better performance.

Miles defined product value as the ratio of two elements: function/cost. The function of an item is the specific work it was designed to perform, and the cost refers to the cost of the item during its life cycle. The ratio of function to cost implies that the value of a product can be increased by either improving its function or decreasing its cost. In value engineering, the cost related to production, design, maintenance, and replacement are included in the analysis. Say, a new tech product is being designed and is slated to have a life cycle of only two years. The product will therefore be designed with the least expensive materials and resources that will serve up to the end of the product's lifecycle, saving the manufacturer and the end consumer money. This is an example of improving value by reducing costs.

UNIT II

V (a) Compare micro motion study and macro motion study

Thus micro motion study is the technique of recording and analyzing the timing of basic elements of an operation with the objective of achieving the best method of performing the operation." Such respective short duration activities involve quick movement of limbs which cannot be accurately studied and timed using two handed process charts. This is due to the fact that such record microscopic details such as different operation, Inspection and transport

etc. Study of such microscopic movements in short cycle repetitive jobs is not sufficient.

Short cycle operations require to be studied for microscopic motions e.g., operation of picking up a nut from bin and its fixing consists of three hand motions namely reach for the nut, grasp nut and move hand back to assembly position. Such detailed analysis help to develop the best possible pattern of movements and hence enabling the operator to perform various operations repeatedly with minimum effort and fatigue.

Micro motion study is one of the most accurate techniques of work analysis used for work improvement. It makes use of motion pictures of the different activities or movement, so with the help of camera. Very small time up to 0.0005 minute can be measured and recorded by this system.

(b) Explain the rules concerning work place lay out

- Safety rules that must be observed
- Absence and tardiness policy (how to report the number of allowable sick days and personal days off)
- How to record time worked (for example, using a time clock or time sheet)
- Lunch period and break rules
- Overtime policy
- Dress code or personal appearance rules
- Rules covering use or damage to employer's property
- Rules about keeping employer's and customers' sensitive information confidential

OR

VI (a) Explain method study and its objectives.

Always, the objective of method study is to simplify the job and develop more economical methods of doing it. Method study is systematic both in investigation of problem being considered and in the development of its solutions. It can be stated as one of most penetrating tools of investigation available to management

(1) The improvement of processes and procedures.

(2) Factory and work place layout improvement.

(3) Improvement in the design of plant and equipment.

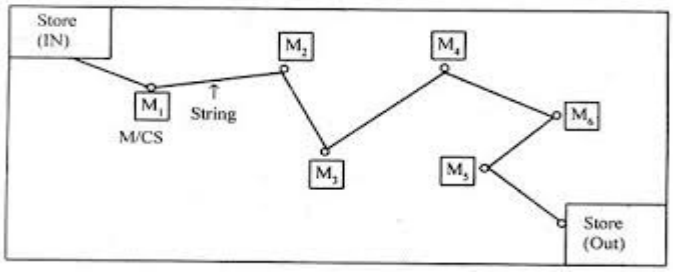
(4) Reduction in unnecessary fatigue and movements.

(5) Use of improved materials, machines and manpower.

(6) Better Working conditions.

(b) Explain the string diagram with sketch and its drawback.

String diagram is one of the useful and simplest techniques of method study. It can be **defined** as a scale model on which a thread is used to trace the path or movements of man and materials during a specified sequence of events.



(1) A string diagram represents the record of an existing set of conditions and thus helps the methods engineer in visualizing the actual situation.

(2) It indicates complex movements, back tracking, congestion, bottle necks and over and underutilized paths on the shop floor.

(3) It is an aid for comparison between different layouts or the methods of doing a job as far as the distances moved are involved.

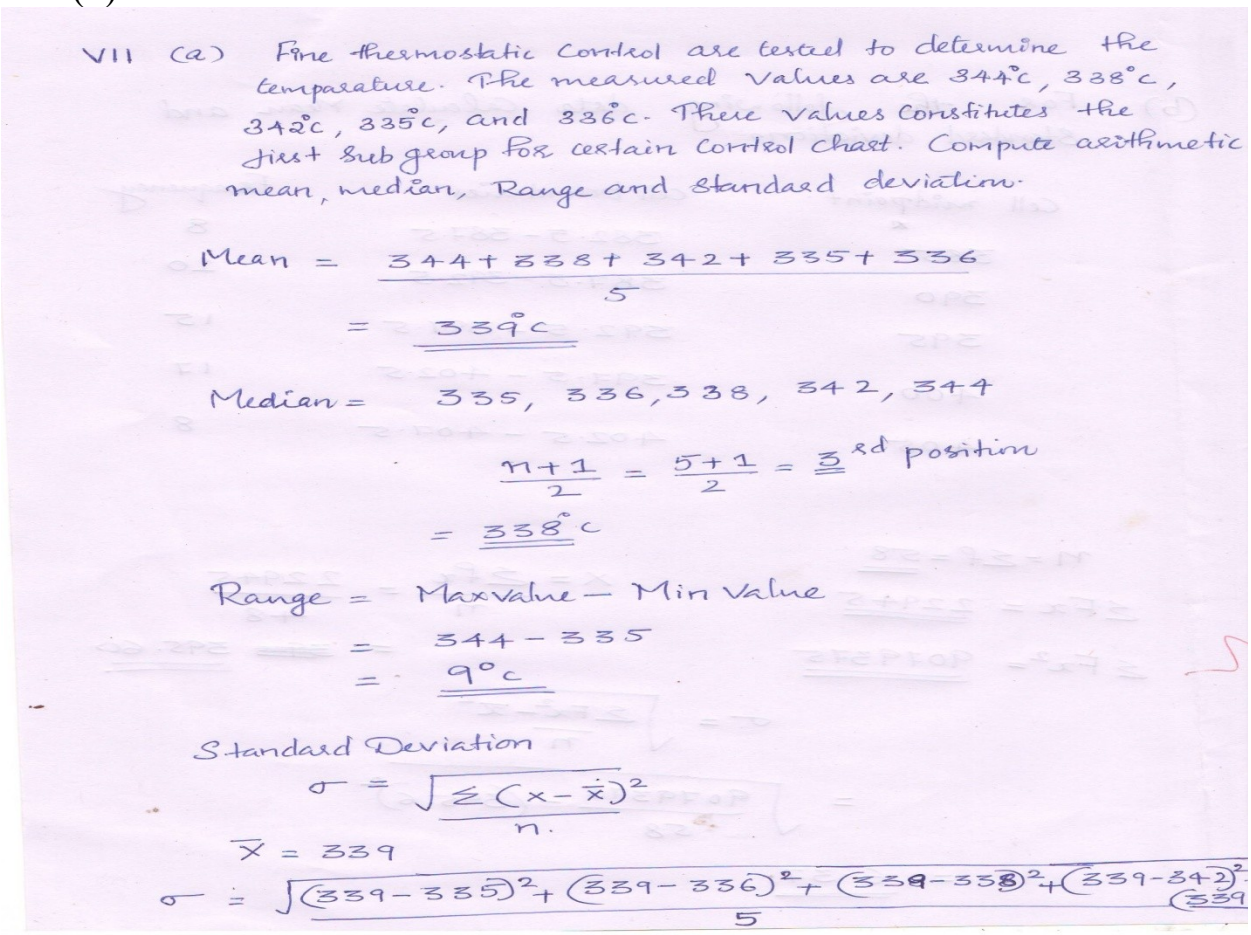
(4) It helps in tracing existing paths of movement for incorporating necessary modifications if any.

(5) It is preferred when movements are not regular as far as frequency and distance moved are concerned.

(6) Indicates the pattern of movements and thus helps in deciding the most economical routes to perform a particular operation.

UNIT III

VII (a)



VII (a) Five thermostatic control are tested to determine the temperature. The measured values are 344°c, 338°c, 342°c, 335°c, and 336°c. These values constitutes the first sub group for certain control chart. Compute arithmetic mean, median, Range and standard deviation.

Mean = $\frac{344+338+342+335+336}{5}$

= 339°c

Median = 335, 336, 338, 342, 344

$\frac{n+1}{2} = \frac{5+1}{2} = 3^{rd}$ position

= 338°c

Range = Max value − Min value

= 344 − 335

= 9°c

Standard Deviation

$\sigma = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n}}$

$\bar{x} = 339$

$\sigma = \sqrt{\frac{(339-335)^2+(339-336)^2+(339-338)^2+(339-342)^2+(339}{5}}$

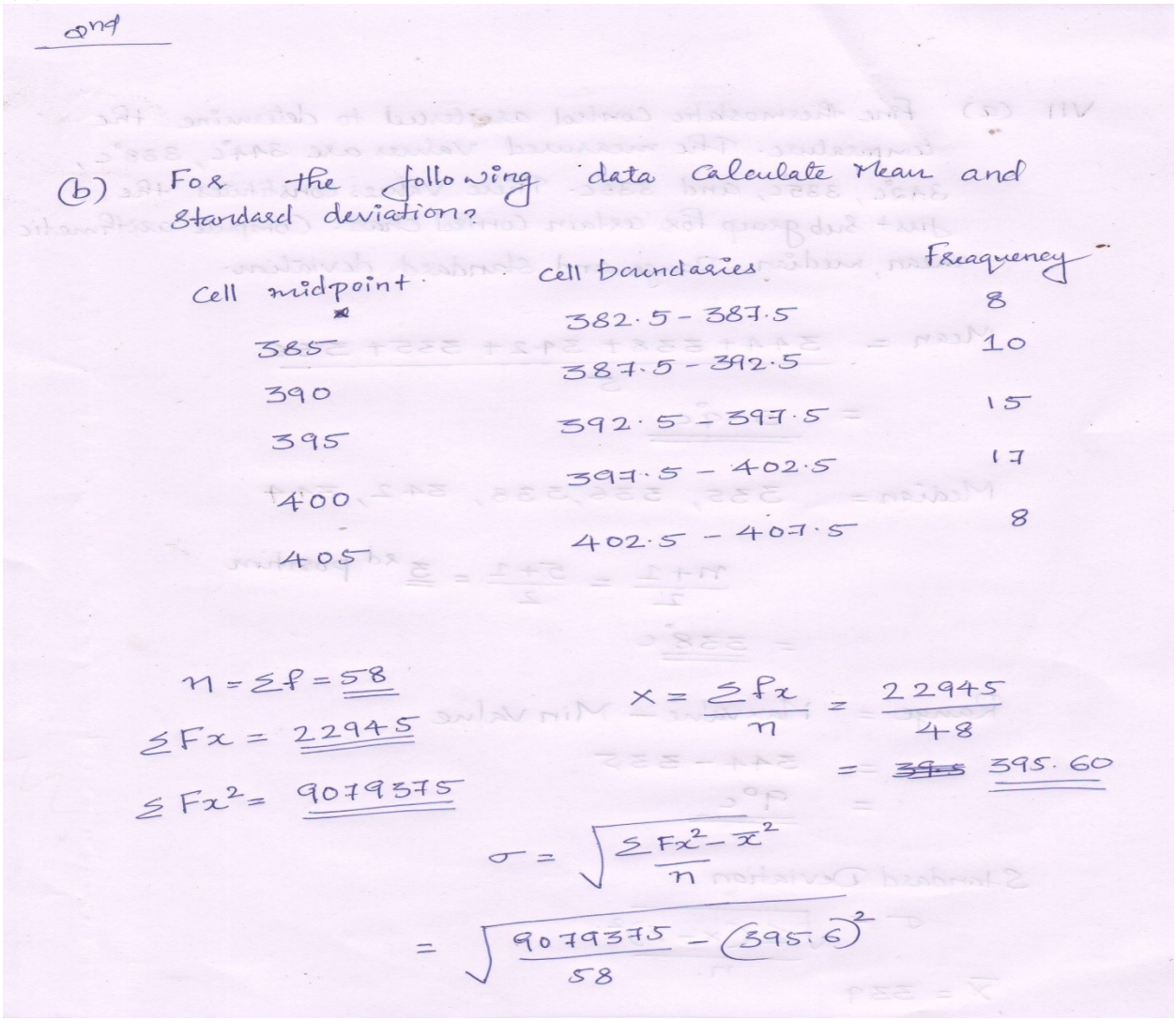
(b) Explain the concept of variability

Variability is the extent to which data points in a statistical distribution or data set diverge from the average, or mean, value as well as the extent to which these data points differ from each other. There are four commonly used measures of variability: range, mean, variance and standard deviation. Variability is used to standardize the returns obtained on an investment and provides a point of comparison for additional analysis. One measure of reward-to-variability is the Sharpe ratio, which measures the excess return or risk premium per unit of risk for an asset. In essence, the Sharpe ratio provides a metric to compare the amount of compensation an investor receives with regard to the overall risk being assumed by holding said investment. The excess return is based on the amount of return experienced beyond investments that are considered free of risk. All else being equal, the asset with the higher Sharpe ratio delivers more return for the same amount of risk.

VIII (a) Explain C chart and Pchart also explain advantage of control chart

A **c-chart** is an attributes **control chart** used with data collected in subgroups that are the same size.**C-charts** show how the process, measured by the number of nonconformities per item or group of items, changes over time. Nonconformities are defects or occurrences found in the sampled subgroup. In statistical quality control, the **p-chart** is a type of control **chart** used to monitor the proportion of nonconforming units in a sample, where the sample proportion nonconforming is defined as the ratio of the number of nonconforming units to the sample size, n.

(b)



Unit IV

IX (a) Explain over headed expenses and its classifications.

Cost pertaining to a cost centre or cost unit may be divided into two portions direct and indirect. The indirect portion of the total cost constitutes the

overhead cost which is the aggregate of indirect material cost, indirect wages and indirect expenses. CIMA defines indirect cost as "expenditure on labour, materials or services which cannot be conveniently identified with a specific saleable cost per unit."

Indirect costs are those costs which are incurred for the benefit of a number of cost centers or costs units. Indirect cost, therefore, cannot be conveniently identified with a particular cost centre or cost unit but it can be apportioned to or absorbed by cost centers or cost units.

The various classifications are:

(i) Functional classification,

(ii) Classification with regard to behavior of the expenditure,

(iii) Element-wise classification,

(iv) Classification according to nature of expenditure.

(b) Comparison of estimation and costing

1,estimation is finding the cost before it has been actually manufactured. and costing is finding cost after manufacturing the product including the defect product cost.

2,estimation need high technical skills and knowledge hence its done by engineering department but costing need high accounting skills hence its usually done by accountants or account departments

3,estimation foresee the probable cost and hence it can be used to decide whether one need to produce a particular product or not. or if its profitable or not

OR

X (a) Explain OC curve and its different region

(b) Explain the advantages of sampling inspection.

Sampling inspection is a technique to determine whether a lot or population should be rejected or accepted on the basis of the number of defective parts found in a random sample drawn from the lot. If the number of defective parts exceeds a predefined level, the lot is rejected

Advantages of Sampling Inspection:

(a) It involves less amount of inspection to achieve a pre-decided degree of certainty about the quality.

(b) It consumes less time, and is less expensive.

(c) Fatigue and boredom incurred by the inspectors is much less, hence their operating efficiency remains high,

(d) It is more accurate because in 100 percent inspection, errors get introduced because of the fatigue and boredom incurred by the inspectors due to large inspection work of repetitive nature.

(e) Since fewer pieces are inspected, no damage is done to the remaining pieces of the lot as they are not handled.

(f) In certain cases where the components are to be inspected by destructive testing or where a powder is to be chemically analysed, 100 percent inspection can never be employed.