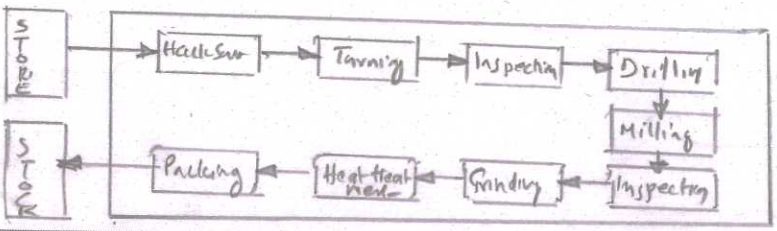
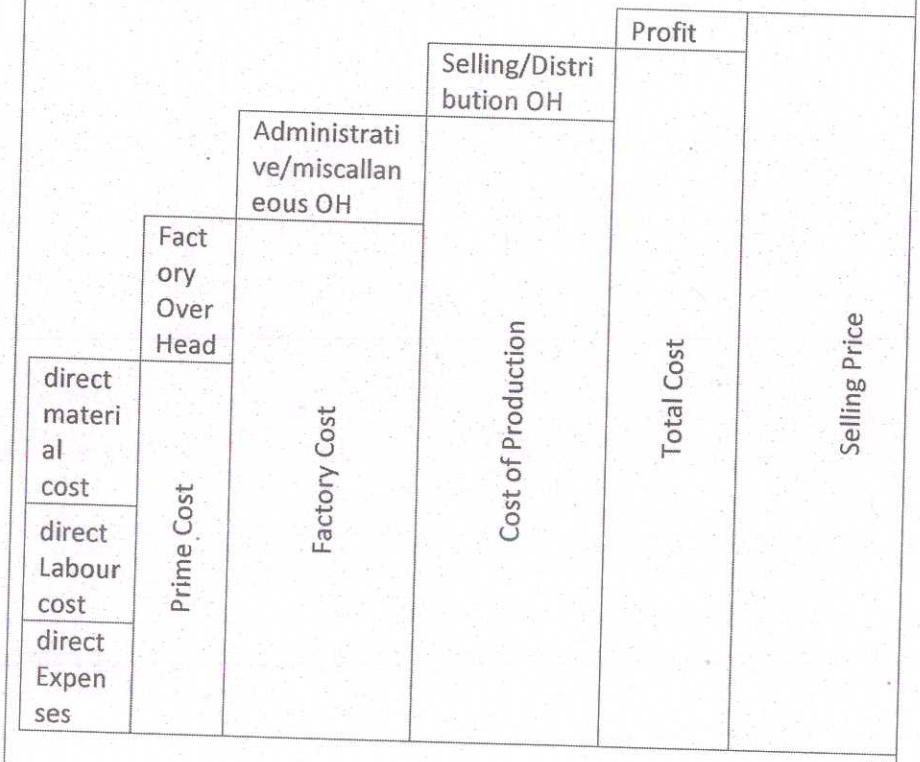
SCHEME OF EVALUATION
(SCORING INDICATORS)

Revision: 2015.

Course Code: TED (15) 5022

Course Title : INDUSTRIAL ENGINEERING.

Q.No	Scoring indicator	Split up score	Sub total	Total score
I,1	The term industry refers to that part of business activity which is concerned with, production, processing or fabrication of products.		2	2
I.2	Crane, hoist, trolly, forklift,	1x1/2	2	2
1.3	To improve the present process, effective utilization of men, material and equipment, to minimise wastage	1x1	2	2
1.4	Mean ,median and mode			2
1.5	Depreciation may be stated as the loss due to decreasing efficiency and their by the loss in the original value of fixed assets.		2	2
II.1	1. Preventive maintenance 2.Predictive maintenance 3.breakdown maintenance 4. Scheduled maintenance. 1. Preventive maintenance is the routine maintenance practice. It consists of locating weak points such as bearings and vibrating components in all the equipment and inspecting the faults followed by immediate repairs. 2. Predictive maintenance is relatively a new technique of maintenance. It make use of various sensors to identify unusual sound and detected the fault at right time and necessary maintenance is done. This will extends the service life of an equipment without fear of failure. 3. breakdown maintenance repairs are attended to the equipment on its failure 4.Scheduled maintenance is is aimed at avoiding breakdown by maintaining the equipment according to a fixed time table	Any 3X2	6	6
II.2	1.Produt Layout 2.Proess Layout 3.Fixed position Lay out 4. Combined Lay out. Product Layout:- In this type of layout machines are arranged along the product line . All the machine required in processing of a product are grouped together in a department and are installed according to the sequence of operations fig; 	1 3 2		6
II,3	Select the work to be analysed Record all facts relating to the existing method Examine the recorded facts critically and impartially Develop the most practical and economic method of doing the job Install the new method as a standard practice Maintain New method.	any 6x1		6
II,4	1. To assure quality of a product 2. To improve quality in all aspect 3. To ensure customer satisfaction. 4. To elevate image and reputation of the firm 5. Overall performance of the firm can be improved 6. To increase production and profit. 7. To aid in standardisation and interchange ability	Any 6x 1		6

II.5	Floor Inspection	Centralised inspection	Any 6x1		6
	1.Inspection is done in shop floor	1. Inspection is done in centralised place.			
	2.suitable for heavy and light work	2.suitable for light work			
	3.corrective action can be taken immediately	3. More time taken for corrective anion			
	4. No damage due to less handling	4. More chances of damage as handling is more			
	5.Inspection may be biased	5. No bias inspection			
	6.Piling of work near the machine	6.No piling of work			
	7.Maintenance of inspection records is difficult	7. record keeping is easy			
II.6	Estimating is calculation for factory cost of a product before it is actually produced. Costing is reckoning of the actual cost incurred in making product after it has been manufactured Estimating indicates whether it would be profitable to manufacture a product or not Estimating requires technical knowledge whereas costing is the job accountants Estimating gives us an idea of expected cost of a product whereas costing tells us the actual cost. Estimating and costing		Any 6x1		6
II.7					6

	Part.C			
III.a	1.Job Production 2.Batch production 3. Mass production 4.Continues production. 1.Job production includes production of special products. It meets individual requirements less risk and flexibility of production. But raw material cost is slightly high and high labour cost. 2. Batch production or intermittent production includes production of number of identical items such as drug, biscuits etc, In this process division of labour is possible, and process layout is well suited and variety of products can be manufactured. 3.Mass Production includes the production of a items as a large quantity. Better quality products produced at a lower cost is possible. But heavy losses in the event when reduced the demand. 4. Continues production raw material enters at one point and leaves as finished product at another point , sequence of flow of products during production remains same , like, cement production .Good plant maintenance and effective quality control is essential in continues production	4x2	8	8
III.b	1.increasing the output for a given input. 2.By right utilisation of human resources through motivation. 3.By adopting latest technology such as automation. 4.By promoting research and development. 5.By standardising the product. 6. By reducing the wastage at a minimum. 7. Improoved product design. 8.By employing value analysis.	Any 7x1	7	7
IV.a	The main functions of PPC are 1.Preplanning, 2.Planning, 3.ontrolling. 1. Preplanning: Preplanning function of PP should be done before the active planning for production.Thepre planning includes following activities.- i. Forecasting, ii. Order writing, iii ,product design, and iv, process planning 2..Planning:- In planning function there are different activities such as ,men, material and machine planning, Routing, Scheduling and estimating. Routing is the determination of path that the material should follows in the plant as it is manufactured and scheduling determines the starting and completion of various operations in the manufacture of a product 3. control:-.in this function contains ,dispatching, Inspecting, expediting and evaluation Dispatching is the execution function of planning. Dispatching is realising the work order and other documents to different department to start the production activities.	1 2 2 2 1		8

<table>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>IV.b</td><td>Factors influencing plant Layout

1. Type of production. 2.Type of production system,3.availability of area,4.Material handling system,5.Type of building,6.Future expansion plan.

1. Type of production: Plant layout must be suitable for type production such as, batch production, mass production, etc.

2. Type of production system:-The production system determines process, procedure, machine and time taken for each product.

3. Availability of area:-The layout depends upon the available area of the pant.

4. Mataerial handling system:-The appropriate material handling system is selected according to the layout.

5. Type of building:-The building should be capable of accommodating the machines and material handling system. It should provide adequate strength and ventilation area.

6. Future expansion:- The layout should permit space for future expansion, The space required of various activity must be considered.</td><td>6X1/2

Explanation 4</td><td>3

4</td><td>7</td></tr>
<tr><td>V,a</td><td><table><tr><th>THERBIG</th><th>symbol</th><th>code</th><th>explanation</th></tr><tr><td>Search</td><td>  </td><td>SH</td><td>Attempt to find an objet</td></tr><tr><td>Find</td><td>  </td><td>F</td><td>Mental reaction to the end of search</td></tr><tr><td>select</td><td>  </td><td>ST</td><td>choosing an object among the group</td></tr><tr><td>Grasp</td><td>  </td><td>G</td><td>Gaining control over an object</td></tr></table></td><td>4X2</td><td>8</td><td>8</td></tr>
<tr><td>V.b</td><td>1.To determine the working and ideal time of me and machine

2.To establish a time standard for an operation

3.To measure the performance of workers

4.To establish wage structure

5.To estimate allowances for unavoidable delay

6.It helps to describe resource utilization

7.It is used in all type of industries</td><td>7

x1</td><td>7</td><td>7</td></tr>
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VI.a	1.Obtain and record all information about the job 2.Break down the job into simple and small element 3.Examine the detailed breakdown to ensure the most effective method 4.Measure with a stop watch 5.Rating the performance 6.Extend the observed time to basic times 7.Determine the allowance 8.Determine the standard time for the operation	8x1	8	8
VI,b	Solution:- Standard time =Normal time + allowances Normal time=(Average observed time X Performance rating %)/100 Average observed time=(0.12+0.15+0.20+0.16+0.12+0.25)/6 = 0.167 min Normal time=0.167X(110)/100=0.1837 Allowance=10% of 0.1837 =0.01837 Standard time =0.1837+0.01837 =0.202minute	1 1 2 1 1 1		7
VII.a	steps for plotting X bar and R chart 1.Select number of samples 2. calculate the average "X" bar 3. calculate range" R" for each sample 4.alulate grant average "X double bar" average range "R"bar 5. calculate control limit for X A2 chart UcLx= X +A2 R LcLx= X – A2 R 6. calculate e control limit for R chart UcL R = D4 R UL R = D3 R Plot graph and Mark control Limits	5 3		8

VII.b

Attribute chart	Variable chart
1.Used to check whether conforming or not to specification	1.Used for quality characteristic that an be measured data
2.P chart, c hart nP chart are attribute chart	2.X bar and R charts are variable harts
4.Used for any number of quality characteristics in one chart	3.Variable charts are suitable for ritial dimension
4.Any quality characteristic can be included in one chart	4.Seperate chart is required for each dimensions
5. It shows the presence of assignable causes	5.It is suitable for catual cause of variation
6.sample size is generally larger	6.The variation of sample size influene the control limits
7.Best for providing quality history	7.It is not used for providing quality history

Any 7 x1 | 7

VIII.a Sol. | 8

Sample No	1	2	3	4	5	6	7	8	9	10	Total
No.of Defective	4	10	10	8	6	5	6	3	3	5	60
Fraction Defective	0.04	0.10	0.10	0.08	0.06	0.05	0.06	0.03	0.03	0.05	0.60

Sample size =n=100, No of sample = 10, total No of items inspected =10x100 = 1000

Total No. Of defective =60

Average fraction defective= 60/1000 = 0.06 — 2

.q=(1-p) = (1-0.06)=0.94, standard deviation $= \sigma_p = \sqrt{\frac{pq}{n}}$

$= \sqrt{\frac{0.06 \times 0.94}{100}} = 0.0237$

$UCL_p = p + 3\sigma_p = 0.06 + 3 \times 0.0237 = 0.1311$

$LCL_p = p - 3\sigma_p = 0.06 - 3 \times 0.0237 = -0.0111$ — 3

Control Limit $CL = p = 0.06$

Comment- Since all the points are within control limit So process is under control. — 1

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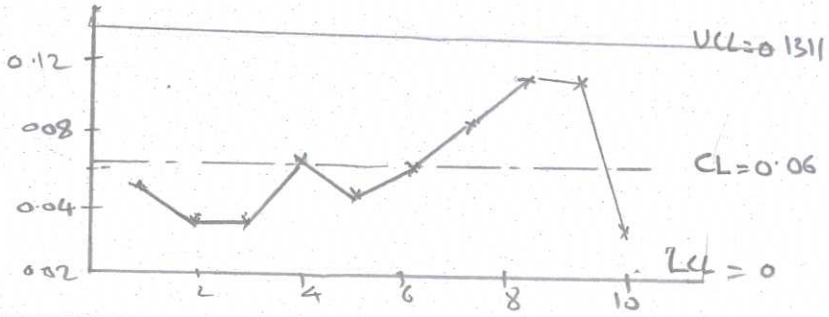
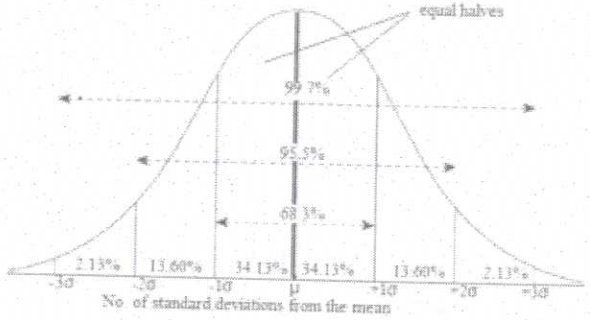


2

VIII.b



Figx5 — 5

The normal distribution curve is a bell shaped curve. The greatest usefullness of normal distribution urve lies in the relationships obtained from the knowledge of area under the curve lying between certain limits on base line. — Expx 1 — 1 — 7

The most ommonly quoted limits in onnetion with the curve are as follows.

SpeSpecification limit	% of area within the speific
	99.73
	95.46
	68.26

Lim x 1 — 1

IX.a

Sol:
Direct Labour cost = Rs.220/-
Direct material cost =Rs.250/-
Direct expenses =Rs.230/-
Prime Cost =220+250+230 =Rs.700/- — 2
80% direct material cost is consider as Factory OH = 250X0.8=Rs.200/-
Factory cost=Prime cost + factory OH = 700+200= Rs. 900/-
Selling price=factory cost +cost of production+ Total cost Profit — 5 — 8
=900+0+0+(900x0.1)=Rs.990/- for 100 product
Selling price per product = Rs.9.90/- — 1

IX.b

1.Direct material cost 2.Indirect material cost 3.Direct Labour cost, 4.Indirect Labour cost 5.Direct Expenses, 6.Indirect Expenses a. Fixed Overheds,b. Variable overheads, — 7x1 — 7

X.a	Sol. Cost of the machine=Rs.28000,Installation charges =Rs.2000 Total Cost of asset C = Rs.30,000/- Salvage Value S =Rs.3000/- Total no of years of use full life N= 15 years Depreciation fund set aside at the end of every year = C-S/N =30000-3000/15 =Rs.1800/- Total Depreciation fund set aside at the end of 3 years and seven months = 3x1800 =Rs.5400/=	3 3 2		8
X.b	1. Depreciation due to wear and tear 2.Depreciation due to physical decay 3.Depreciation due to Accidents 4.Depreciation due to Differed maintenance 5.Depreciation due to inadequacy 1. Depreciation due to wear and tear:-Any fixed asset like processing plant, machine, etc, is subjected to regular use, wearing of certain parts of the asset is bound to occur due to the presence of friction between sliding and rotating parts. The loss in the original value of the asset mainly due to this is known as Depreciation due to wear and tear 2. Depreciation due to physical decay: - Assets like factory building, overhead tanks, steel structures vehicles etc,. Whether in use or not subjected to climatic and atmospheric effects which slowly reduce their strength and serviceability due to oxidation, wrotting of wood, etc, they have to be replacing by new one. The loss in the original value of the asset mainly due to this is known as Depreciation due to physical decay. 3. Depreciation due to Accidents:-Some times accident may occur even in newly installed or commissioned machine, plant. Building etc,. Due to faulty operation, fire hazard, the asset may require either re placing of heavy investment to repair. The loss in the value of assets due to in imaginable and unforeseen accidents known as depreciation due to accident. 4. Depreciation due to Differed maintenance:-Manufactures of machinery. Vehicles etc, usually supply instruction booklets contain important instruction regarding periodic maintenance and servicing. If such important instructions are not followed in time or negligence, the performance efficiency of the assets gradually decreases. The losses of efficiency due to this is known as Depreciation due to Differed maintenance 5. Depreciation due to inadequacy:- In the case of increased demand for the products to manufactured , sometimes may be necessary to install additional plant of machinery of the same type or bigger size or more efficient one. The loss of the value of the asset due to decrease in performance efficiency or accruing money required to install and commission additional machinery to meet the increased demand for the product is known as depreciation due to inadequacy	Any 4X1/2 Any four explanation 5	2 5	7