

## Scheme of Valuation/Answer Key

*Scheme of evaluation (marks in brackets) and answers of problems/key*

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

**EIGHTH SEMESTER B.TECH DEGREE EXAMINATION, MAY 2019**

**Course Code: ME404**

**Course Name: INDUSTRIAL ENGINEERING**

Max. Marks: 100

Duration: 3 Hours

### PART A

*Answer any three full questions, each carries 10 marks.*

		Marks
1	a) Using an example explain the following 3 levels Useful- the product should fulfil a need or purpose Usable- It must be easy to use Desirable- if the product evokes emotion and appreciation (3 marks)	(3)
	b) Functional design and design for production definition (2 marks each)	(4)
	c) Function analysis explanation (2 marks), example (1 mark)	(3)
2	a) Steps of new product development: (2 marks) i. Concept generation ii. Design iii. Development iv. Production Example- 1 mark	(3)
	b) Significance of life cycle costing-1 mark Types of costs over the life-cycle of a product-1 mark Relevance of example-1 mark	(3)
	c) Question lacks clarity. If the student writes anything about i. business process outsourcing or ii. make or buy decisions or iii. Purchase or acquirement of resources, then 4 marks should be awarded.	(4)
3	a) Fixed Layout Definition- Machines and men are brought to the product (2 mark) Practical situations which necessitates fixed layout, eg. Ship building industry (2 marks)	(4)
	b) Factors responsible for replacement of equipment in working conditions: i. Technical factors	(3)

- ii. Cost factors
- iii. Tangible factors (1 mark each for each factor with explanation-total 3 marks)
- c) Unit load (3)
- Principle of unit load- materials should be moved in lots rather than on individual basis (1 mark)
- How unit load can be accomplished- containerization, palletisation, stack forming etc. (2 marks)
- 4 a) Symptoms of bad plant layouts, (3)
- i. Congestion of machines
- ii. Excess work in process
- iii. Long material flow lines
- iv. Employee Fatigue
- v. Regular accidents (any 3 valid points- 3 marks)
- b) Fixed path material handling equipment serves the material handling need along a fixed path (like on a guided track). example of a fixed path system are trains and railroad tracks as trains can travel from any point to point, serving at any point that is along the track system, conveyor systems, powered, gravity-fed, automated guided vehicles etc. (3 marks)
- c) Product Layout (4)
- i. Used when machines and auxiliary services are located according to the processing sequence of the product. (1 mark)
- ii. Neat sketch (1 mark)
- iii. Advantages- Smooth product flow, less in-process inventory, low material handling cost, less space (1 mark)
- iv. Limitations- High investment, change in product design require major alterations in layout, etc (1 mark)

### PART B

*Answer any three full questions, each carries 10 marks.*

- 5 a) Question incomplete and no clarity. So full marks (3 marks) may be awarded if attended (3)

- b) Multiple Activity Chart (3)  
 -is a pictorial representation of activities of individuals and associated facilities/machines simultaneously on a common time scale. (2 marks)  
 -Sample chart (1 mark)
- c) Work Study (4)  
 Steps of methods study + work measurement (2 marks)  
 Areas of application of method study and work measurement (2 marks)
- 6 a) Performance Rating Method (4)  
 i. Pace Rating  
 ii. Westinghouse System of rating  
 iii. Objective rating  
 iv. Synthetic rating (4 marks)
- b) i. Determination of basic time (3)  
 ii. Identify the allowances  
 iii. Sum of basic time + allowances = Standard time (3 marks)
- c) Types of allowances (3)  
 Any three allowances \*(Relaxation allowances, Contingency allowances, Special allowances, Process allowances etc.) –(3 marks)
- 7 a) Labour Welfare (4)  
 -to increase the standard of living  
 -provides job security  
 -to reduce the labour problems in the organization  
 -Compensation for workers suffering industrial accidents or any valid point (4 points 1 mark each-4 marks)
- b) Recent labour welfare laws passed by the legislation (3 marks) (3)  
 Government schemes, etc.
- c) Any three points with explanation (3 marks) (3)
- 8 a) Explanation (5 marks) (5)
- b) Direct costs: (5)  
 cost of insurance, costs associated with damages, such as a direct payment to a third party or other deductibles.

Indirect costs:

Lost productivity due to the absence of an injured worker or workers, lost productivity of employees who assist in the rescue, clean-up, and repairs caused by an accident, the cost to repair or replace damaged property, equipment or vehicles, rental costs while equipment or vehicles are repaired, the loss of a revenue stream or contract, damage to an organization's public image, Overtime expenses incurred by additional staff needed to make up for the lost worker or workers, loss of customer loyalty due to negative publicity.

Any 5 points (5 marks)

### PART C

*Answer any four full questions, each carries 10 marks.*

- 9 a) Objectives of PPC (5)
- i. Scheduling
  - ii. Organize
  - iii. Achieve stated production objectives or any valid points (3 marks)
- Enhancement of performance of an industry (any 2 valid points-2 marks)
- b) Five differences, 1 mark each (5 marks) (5)
- 10 a) P System-stock price is once in a fixed period and an order is placed depending on the stock position, diagram (2.5 marks) (5)
- Q System- whenever the stock level touches the reorder level, an order is placed for a fixed quantity which is equal to EOQ, diagram (2.5 marks)
- b) Aggregate planning in a manufacturing enterprise (5)
- Strategies for aggregate planning (Pure strategies, Mixed strategies, (any one strategy)) (2.5 marks)
- Aggregate Planning methods- (Graphical method, Heuristic method (any one method)) (2.5 marks)
- Mark liberally.
- 11 a) Advantages of cellular manufacturing systems over conventional manufacturing systems (3)
- i. Reduction in cycle times

- ii. On time deliveries
- iii. Improvement in quality etc..

Explanation of any 3 valid points (3 marks)

- b) Advantages of cellular manufacturing (4)

shorter lead times, higher productivity, decreased throughput time, increased flexibility, improved quality and increased output, enhanced communication etc.(2 marks)

Disadvantages of cellular manufacturing

Setup times or change over times may not always be significantly reduced just because the components in the family bear apparent similarity, Improper cell formation, resulting in inefficiencies in terms of time, investment and humanistic aspects, Inadequacies in employee education training and involvement etc.. (2 marks)

- c) Dispatching (3)

Dispatching may be defined as setting production activities in motion through the release of orders (work order, shop order) and instructions in accordance with the previously planned time schedules and routings.

Expediting

Expediting or progressing ensures that, the work is carried out as per the plan and delivery schedules are met.

Any 3 differences (3 marks)

- 12 a) Factors affecting quality (5)

- Use of production technology
- Skill set, tools, and experience of labour
- Availability of needed raw materials
- Storage facilities
- Carriage or transport facility. Etc. (explain any 5 valid factors-5 marks)

- b) Inspection: (5)

- i. Inspection means checking of material, product or components, of product at various stages
- ii. Emphasis is placed on the quality of the final production.

Quality control:

- i. Emphasis is placed on the quality of future production.
- ii. Periodic samples are taken from the output and items in each sample is inspected.

5 differences- 5 marks

13 a) Material Testing (3)

\*destructive testing, non-destructive testing methods(1 mark)

\*Importance of material testing

Importance of material testing

- Meeting requirements of regulatory agencies
- Selecting appropriate materials and treatments for an application
- Evaluating product design or improvement specifications
- Verifying a production process (2 marks)

b) Static Testing, Impact Testing, Cyclic Testing (4)

Or

Tensile Testing, Bend Testing, Impact Testing, Nick Break Testing, Hardness Testing (any 4 - 4marks)

c) Visual Inspection, Hydrostatic Pressure Test, Magnetic Particle Inspection, Radiographic Examination, Ultrasonic inspection, Dye Penetrant Inspection, Coin Testing. (brief description of any 2 – 3 marks, 1.5 marks each) (3)

14 a) Different phases of bath tub curve (4)

Early failures, rare failures, and normal wear out failures (explanation- 3 marks)

Sketch- 1 mark

b) Visual Inspection, Liquid Penetrant Inspection, Acoustic Emission, Magnetic Particle Inspection, Eddy Current Inspection, Ultrasonic Inspection, Radiographic Inspection (list out any 3 methods-1 marks) (3)

Benefits of NDT methods- safety, reliability, affordability, Identify Areas of Concern Before Failure, Less Waste (2 marks)

c) Any one NDT method (3)

Explanation-2 marks

Neat sketch-1 mark

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