

**INDUSTRIAL ENGINEERING
(MECH 3224)**

Time Allotted : 2½ hrs

Full Marks : 60

Figures out of the right margin indicate full marks.

*Candidates are required to answer Group A and
any 4 (four) from Group B to E, taking one from each group.*

Candidates are required to give answer in their own words as far as practicable.

Group – A

1. Answer any twelve:

12 × 1 = 12

Choose the correct alternative for the following

- (i) In a continuous type of production, factories adopt
 - (a) Product layout
 - (b) Process layout
 - (c) Combined layout
 - (d) Fixed position layout.
- (ii) At the breakeven point
 - (a) total cost is more than the sales revenue
 - (b) total cost is less than the sales revenue
 - (c) total cost is equal to sales revenue
 - (d) fixed cost is equal to variable cost.
- (iii) Which of the following functions of PPC is related to the timetable of activities?
 - (a) Scheduling
 - (b) Dispatching
 - (c) Expediting
 - (d) Routing.
- (iv) Break even is not affected with changes in
 - (a) Sales price per unit
 - (b) Variable cost per unit
 - (c) Total fixed costs
 - (d) Number of units sold.
- (v) Gantt's charts are used for
 - (a) Forecasting sales
 - (b) Productions schedule
 - (c) Routing and scheduling
 - (d) Linear programming.
- (vi) Just-In-Time production aims at
 - (a) Zero inventories
 - (b) Reduced manpower
 - (c) Over production
 - (d) Intermittent production.
- (vii) The disadvantages of product layout is
 - (a) skilled labour to operate machines
 - (b) high initial investment for the specialized facilities
 - (c) production time is longer, requiring more goods in inventory
 - (d) high cost of inspection.

- (viii) The aim of value engineering is to
 (a) find the depreciated value of a machine
 (b) determine the selling price of a product
 (c) minimize the cost without change in quality of the product
 (d) maximize the cost with change in quality of the product.
- (ix) Under which of the following circumstances single storey building is preferable over multi-storey building in the context of plant location and plant layout?
 (a) When materials can be handled by gravity feed
 (b) When the material handling is difficult because the product is heavy
 (c) When the acquisition of land becomes difficult and expensive
 (d) When the floor space is less.
- (x) ABC inventory control focuses on those
 (a) Items not readily available (b) Items which consume less money
 (c) Items which have more demand (d) Items which consume more money.

Fill in the blanks with the correct word

- (xi) The machines used for mass production are _____.
- (xii) Basic tool in work study is _____.
- (xiii) CRAFT and CORELAP are _____ methods used in plant layout design, while Relationship Diagrams primarily focus on analyzing spatial relationships between departments.
- (xiv) In work study, time and motion studies are conducted to analyze and improve _____ within a workplace.
- (xv) Merit rating is the method of determining worth of _____.

Group - B

2. (a) Discuss the key activities typically undertaken by industrial engineers to optimize processes and enhance productivity within organizations. [[CO1](Remember/LOCQ)]
- (b) A store sells T-shirts. The average selling is Rs.15 and the average variable cost (cost price) is Rs.9. (i) Suppose the fixed cost of operating the stores (its operating expenses) is Rs.100 000 per year, determine breakeven in units. (ii) If the owner desires a profit of Rs.25000, what will be the breakeven point in Rupees? [[CO1](Evaluate/HOCQ)]
- 6 + 6 = 12**
3. (a) Mention the characteristics of a well designed product. [[CO2](analyze/IOCQ)]
- (b) A company produces 160 kg of plastic moulded parts of acceptable quality by consuming 200 kg raw materials for a particular period. For the next period, the output is doubled (320 kg) by consuming 420 kg of raw material and for the third period, the output is increased to 400 kg by consuming 400 kg of raw material. Comment on the changes of productivity in different periods. [[CO1](Execute/HOCQ)]
- 6 + 6 = 12**

Group - C

4. (a) Explain the importance of selecting an optimal plant location for manufacturing businesses. [[C02](Remember/LOCQ)]
(b) Discuss the role of quantitative methods such as CRAFT, CORELAP and relationship diagrams in the design and optimization of plant layouts. [[C02](Analyze/IOCQ)]
6 + 6 = 12
5. (a) Briefly discuss any three types of plant layout. [[C04](Remember/LOCQ)]
(b) Elaborate briefly on the advantages and disadvantages of single-storey and multi-storey factory buildings. [[C04](Remember/LOCQ)]
6 + 6 = 12

Group - D

6. (a) Discuss the various functions of production planning and control. [[C05](Remember/LOCQ)]
(b) Explain about line balancing technique and steps to be followed in line balancing technique. [[C05](Remember/LOCQ)]
4 + (6 + 2) = 12
7. (a) What is meant by economic order quantity (EOQ)? Develop a relationship between EOQ in terms of ordering cost, carrying cost and cost per piece. [[C03](Analyze/IOCQ)]
(b) Explain the scheduling procedure with suitable example. [[C03](Remember/LOCQ)]
6 + 6 = 12

Group - E

8. (a) Mention the recording techniques used in method study with the usages of common symbols, activities and the implications of such activities. [[C06](Analyze/IOCQ)]
(b) A work study practioner who conducted a work sampling study assesses the activity level of a worker to be 70%. During the space of 8 hours working, this worker turns out 320 components. If the company policy is to inflate the normal time arrived by work sampling study by 20%, what would be the allowed time per unit? [[C05](Evaluate/HOCQ)]
6 + 6 = 12
9. (a) Assuming that the total observed time for an operator of assembling an electric switch is 1.00 minute. If the personal rating of the operator is 120%, find normal time. If an allowance of 10% for basic fatigue is specified for the operator, determine the standard time. [[C06](Evaluate/HOCQ)]
(b) Define productivity and explain its significance in the context of business operations. [[C05](Remember/LOCQ)]
6 + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	50	25	25

Course Outcome (CO):

After the completion of the course students will be able to

- CO 1: Interpret the theoretical knowledge about the various tools and techniques of Industrial Engineering (UNDERSTAND)
- CO 2: Develop work procedures about various safety standards to be followed In carrying out different types of equipments or systems (CREATE)
- CO 3: Implement the Inventory Management Principles & Techniques (APPLY)
- CO 4: Make judgments based on the criteria and standards through Quality Control Practices and Testing Methods (EVALUATE)
- CO 5: Identify to prepare production planning and the control procedures with the knowledge of industrial legislation (REMEMBERING)
- CO 6: Determining how the productivity improvement tools relate to one another for an overall structure or purpose through differentiating, organizing and attributing (ANALYZE)

**LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question.*