

GTH 502 APPAREL INDUSTRIAL ENGINEERING

UNIT I: INTRODUCTION TO APPAREL ENGINEERING

Part – A

Section I – Multiple Choice Questions (21 × 1 = 21 Marks)

1. Tailoring mainly refers to:

- A. Mass production of garments
- B. Making garments according to individual customer measurements
- C. Automated garment production
- D. Fabric printing

Answer: B

2. Garment units are mainly involved in:

- A. Custom tailoring only
- B. Bulk production of garments
- C. Hand embroidery only
- D. Fabric dyeing

Answer: B

3. Production is defined as:

- A. Selling garments
- B. Converting raw materials into finished garments
- C. Purchasing fabrics
- D. Packing garments

Answer: B

4. Productivity is the ratio of:

- A. Labour to machine
- B. Output to input
- C. Cost to profit
- D. Fabric to thread

Answer: B

5. Which of the following improves productivity?

- A. Better work methods
- B. Increased idle time
- C. Higher material wastage
- D. Machine breakdown

Answer: A

6. Labour productivity measures:

- A. Fabric quality
- B. Output produced per labour input
- C. Number of machines
- D. Garment quality

Answer: B

7. Machine productivity refers to:

- A. Machine colour
- B. Output produced by machines over a period
- C. Number of operators
- D. Number of garments inspected

Answer: B

8. Material productivity measures:

- A. Fabric colour
- B. Efficient utilization of materials
- C. Number of sewing machines
- D. Worker attendance

Answer: B

9. Overall productivity considers:

- A. Labour only
- B. Machine only
- C. Material only
- D. All production resources

Answer: D

10. Which factor affects productivity?

- A. Worker skill
- B. Machine condition
- C. Production planning
- D. All of the above

Answer: D

11. One benefit of increasing productivity is:

- A. Higher production cost
- B. Better profitability
- C. More wastage
- D. Longer lead time

Answer: B

12. Apparel engineering mainly deals with:

- A. Garment marketing
- B. Improving garment production methods and efficiency
- C. Fashion photography
- D. Retail management

Answer: B

13. An apparel engineer mainly aims to:

- A. Increase production delays
- B. Improve productivity
- C. Increase inventory
- D. Reduce quality

Answer: B

14. Which department benefits most from apparel engineering?

- A. Production department
- B. Finance department
- C. Sales department
- D. Security department

Answer: A

15. One advantage of apparel engineering is:

- A. Reduced efficiency
- B. Better utilization of resources
- C. Increased waste
- D. Increased idle time

Answer: B

16. Which productivity measure focuses on fabric utilization?

- A. Labour productivity
- B. Machine productivity
- C. Material productivity
- D. Overall productivity

Answer: C

17. Which production system is generally followed in tailoring?

- A. Mass production
- B. Individual production
- C. Continuous production
- D. Automated production

Answer: B

18. Which production system is generally followed in garment factories?

- A. Individual production
- B. Bulk production
- C. Home production
- D. Prototype production

Answer: B

19. Which of the following reduces productivity?

- A. Poor machine maintenance
- B. Skilled operators
- C. Proper planning
- D. Good supervision

Answer: A

20. Which resource is NOT considered while calculating overall productivity?

- A. Labour
- B. Machines
- C. Materials
- D. Fashion trends

Answer: D

21. Increased productivity generally results in:

- A. Lower competitiveness
- B. Improved customer satisfaction
- C. Increased wastage
- D. Higher production delays

Answer: B

Section II – Analytical MCQs (9 × 2 = 18 Marks)

22. A garment factory increases daily production from 800 garments to 1,000 garments using the same number of workers. This indicates:

- A. Reduced productivity
- B. Improved labour productivity
- C. Increased material wastage
- D. Lower machine efficiency

Answer: B

23. A factory replaces old sewing machines with automated machines and production increases by 30%. Which productivity has improved the most?

- A. Labour productivity
- B. Machine productivity
- C. Material productivity
- D. Financial productivity

Answer: B

24. A factory reduces fabric waste from 10% to 4% while maintaining the same production. Which productivity has improved?

- A. Labour productivity
- B. Machine productivity
- C. Material productivity

D. Marketing productivity

Answer: C

25. Two factories produce the same number of garments. Factory A uses fewer workers than Factory B. Which factory has better labour productivity?

- A. Factory A
- B. Factory B
- C. Both are equal
- D. Cannot be determined

Answer: A

26. An apparel engineer introduces method study, reducing operation time by 15%. What is the most likely result?

- A. Reduced productivity
- B. Increased productivity
- C. Increased inventory
- D. Reduced garment quality

Answer: B

27. A tailoring shop produces 20 custom garments daily, while a garment factory produces 2,000 identical garments daily. Which statement is correct?

- A. Tailoring is suitable for mass production.
- B. Garment factories are designed for bulk production.
- C. Tailoring requires assembly lines.
- D. Both use identical production methods.

Answer: B

28. Which situation demonstrates overall productivity improvement?

- A. Labour productivity increases but machine downtime doubles.
- B. Labour, machine, and material utilization all improve.
- C. Material waste increases.
- D. Production decreases while labour increases.

Answer: B

29. A production line frequently stops because of machine breakdowns. Which factor affecting productivity is most responsible?

- A. Labour skill
- B. Machine maintenance
- C. Fabric colour
- D. Garment style

Answer: B

30. Which action by an apparel engineer is most likely to improve productivity without purchasing new machines?

- A. Increasing overtime only
- B. Improving work methods and line balancing
- C. Increasing fabric inventory
- D. Hiring more workers without planning

Answer: B

Part – B

Descriptive Questions (4 × 10 = 40 Marks)

1. Explain the differences between tailoring and garment unit production with suitable examples.
2. Define productivity. Explain the different types of productivity such as labour productivity, machine productivity, material productivity, and overall productivity.
3. Explain the factors affecting productivity in the apparel industry.
4. Describe the activities of an apparel engineer and explain the benefits of apparel engineering in garment manufacturing.

Analytical Descriptive Question (1 × 12 = 12 Marks)

5. A garment factory has experienced low productivity due to high material wastage, machine breakdowns, and poor work methods. As an apparel engineer, analyze the problems and suggest suitable measures to improve labour productivity, machine productivity, material productivity, and overall productivity. Explain how these improvements will benefit the factory.

UNIT II: APPAREL PRODUCTION SYSTEM AND LAYOUT

Part – A

Section I – Multiple Choice Questions (21 × 1 = 21 Marks)

1. The Whole Garment Production System is mainly used for:

- A. Mass production
- B. Custom-made garments
- C. Fabric dyeing
- D. Marker planning

Answer: B

2. In the Whole Garment Production System, one operator:

- A. Performs only one operation
- B. Completes the entire garment
- C. Cuts fabric only
- D. Packs garments only

Answer: B

3. Which production system is most suitable for bulk production?

- A. Whole Garment Production System
- B. Progressive Bundle System
- C. Tailoring System
- D. Home Production

Answer: B

4. A major advantage of the Whole Garment Production System is:

- A. High production volume
- B. Better quality control by one operator
- C. High automation
- D. Minimum operator skill

Answer: B

5. One disadvantage of the Whole Garment Production System is:

- A. Low productivity
- B. High automation

- C. Low labour skill requirement
- D. High production speed

Answer: A

6. The Group System is also known as:

- A. Team Production System
- B. Continuous Production System
- C. Home Production System
- D. Automated Production System

Answer: A

7. In the Group System, operators work:

- A. Individually without coordination
- B. As a team to complete garments
- C. Only on cutting operations
- D. Only on finishing operations

Answer: B

8. Which production system uses bundles of garment pieces moving from one operator to another?

- A. Whole Garment Production System
- B. Progressive Bundle System
- C. Unit Production System
- D. Group System

Answer: B

9. The Progressive Bundle System is best suited for:

- A. Small-scale tailoring
- B. Mass production
- C. Prototype development
- D. Home sewing

Answer: B

10. Which production system uses an overhead conveyor to move garment parts?

- A. Progressive Bundle System
- B. Unit Production System
- C. Group System
- D. Tailoring System

Answer: B

11. One advantage of the Unit Production System is:

- A. Increased manual handling
- B. Reduced material handling time
- C. Higher work-in-process inventory
- D. Low production speed

Answer: B

12. The Quick Response Sewing System mainly aims to:

- A. Increase inventory
- B. Respond quickly to customer demand
- C. Increase production delays
- D. Reduce operator efficiency

Answer: B

13. Which production system is most flexible for style changes?

- A. Quick Response Sewing System
- B. Progressive Bundle System
- C. Whole Garment Production System
- D. Batch Production System

Answer: A

14. The main objective of a factory layout is to:

- A. Increase material movement
- B. Ensure smooth workflow
- C. Increase production cost
- D. Increase worker fatigue

Answer: B

15. A Flow Forward Layout arranges machines according to:

- A. Worker preference
- B. Sequence of operations
- C. Machine colour
- D. Fabric type

Answer: B

16. Which layout minimizes backtracking of materials?

- A. Flow Forward Layout
- B. Block Layout
- C. Random Layout
- D. Side-to-Side Layout

Answer: A

17. A U-Shaped Layout mainly helps to:

- A. Increase operator communication and flexibility
- B. Increase material handling
- C. Reduce supervision
- D. Increase work-in-process inventory

Answer: A

18. Which layout resembles the shape of the English letter "U"?

- A. Linear Layout
- B. U-Shaped Layout
- C. Comb-Shaped Layout
- D. Block Layout

Answer: B

19. In a Linear Layout, machines are arranged:

- A. In a circular pattern
- B. In a straight line
- C. In separate blocks
- D. Randomly

Answer: B

20. A Comb-Shaped Layout is mainly used to:

- A. Improve accessibility to multiple production lines
- B. Reduce factory space
- C. Eliminate production planning
- D. Replace machine operators

Answer: A

21. Which layout divides machines into separate functional sections?

- A. Linear Layout
- B. U-Shaped Layout
- C. Block Layout
- D. Flow Forward Layout

Answer: C

Section II – Analytical MCQs (9 × 2 = 18 Marks)

22. A factory producing customized designer garments requires each operator to complete an entire garment. Which production system is most suitable?

- A. Progressive Bundle System
- B. Whole Garment Production System
- C. Unit Production System
- D. Quick Response Sewing System

Answer: B

23. A garment factory receives frequent small orders with changing styles. Which production system will best meet customer requirements?

- A. Progressive Bundle System
- B. Whole Garment Production System
- C. Quick Response Sewing System
- D. Traditional Batch System

Answer: C

24. A factory wants to reduce material handling by automatically transporting garment pieces between operators. Which system should it adopt?

- A. Group System
- B. Unit Production System
- C. Whole Garment Production System

D. Tailoring System

Answer: B

25. A production manager notices large bundles waiting between operations, causing delays. Which production system is likely being used?

- A. Unit Production System
- B. Progressive Bundle System
- C. Whole Garment Production System
- D. Group System

Answer: B

26. A factory redesigns its sewing line so materials move continuously without backtracking. Which layout objective is achieved?

- A. Increased material movement
- B. Smooth production flow
- C. Higher inventory
- D. Increased transportation

Answer: B

27. Which layout is most suitable when teamwork, flexibility, and communication between operators are important?

- A. Linear Layout
- B. Block Layout
- C. U-Shaped Layout
- D. Side-to-Side Layout

Answer: C

28. A factory producing thousands of identical shirts daily should select which production system for maximum productivity?

- A. Whole Garment Production System
- B. Progressive Bundle System
- C. Tailoring System
- D. Prototype Production

Answer: B

29. A factory experiences delays because workers frequently move materials between distant departments. Which improvement would most likely increase efficiency?

- A. Increase inventory
- B. Improve the factory layout
- C. Reduce supervision
- D. Increase overtime

Answer: B

30. A production engineer wants to improve flexibility while reducing work-in-process inventory and response time to customer orders. Which combination is most appropriate?

- A. Progressive Bundle System with Block Layout
- B. Quick Response Sewing System with U-Shaped Layout
- C. Whole Garment Production System with Linear Layout
- D. Tailoring System with Side-to-Side Layout

Answer: B

Part – B

Descriptive Questions (4 × 10 = 40 Marks)

1. Explain the objectives, merits, and demerits of the Whole Garment Production System and the Progressive Bundle System.
2. Describe the Group Production System and the Unit Production System with their advantages and disadvantages.
3. Explain the Quick Response Sewing System and discuss its importance in modern garment manufacturing.
4. Explain the objectives of factory layout and describe the different types of layouts used in the apparel industry.

Analytical Descriptive Question (1 × 12 = 12 Marks)

5. A garment factory currently uses a Progressive Bundle System with a Linear Layout. The management is facing problems such as high work-in-process inventory, long production lead time, and frequent style changes from customers. As an apparel engineer, analyze the problems and recommend a more suitable production system and factory layout. Justify your recommendations by discussing their advantages and expected impact on productivity, material flow, and customer satisfaction.

UNIT III: WORK MEASUREMENT

Part – A

Section I – Multiple Choice Questions (21 × 1 = 21 Marks)

1. SAM stands for:

- A. Standard Apparel Method
- B. Standard Allowed Minute
- C. Sewing Analysis Method
- D. Standard Assembly Measurement

Answer: B

2. SAM is mainly used to:

- A. Calculate fabric consumption
- B. Determine the standard time required for an operation
- C. Prepare garment patterns
- D. Measure fabric shrinkage

Answer: B

3. Which department mainly uses SAM in a garment factory?

- A. Production Department
- B. Marketing Department
- C. Finance Department
- D. Sales Department

Answer: A

4. The rating factor in time study measures:

- A. Fabric quality
- B. Operator performance compared to standard performance
- C. Machine cost
- D. Material consumption

Answer: B

5. The purpose of applying a rating factor is to:

- A. Increase observed time
- B. Convert observed time into normal time

- C. Calculate fabric cost
- D. Measure garment quality

Answer: B

6. Allowances are added to normal time to account for:

- A. Fabric defects
- B. Personal needs, fatigue, and unavoidable delays
- C. Garment design changes
- D. Machine purchase cost

Answer: B

7. Which of the following is a type of time study allowance?

- A. Machine Allowance
- B. Relaxation Allowance
- C. Contingency Allowance
- D. All of the above

Answer: D

8. Relaxation allowance is provided to compensate for:

- A. Fabric wastage
- B. Physical and mental fatigue
- C. Machine breakdown
- D. Pattern grading

Answer: B

9. Machine allowance is provided when:

- A. Operators wait for machine operations
- B. Fabric inspection is carried out
- C. Garments are packed
- D. Patterns are graded

Answer: A

10. Interference allowance is mainly applicable when:

- A. One operator handles multiple machines
- B. Fabric is defective
- C. Cutting is delayed

D. Production planning changes

Answer: A

11. Contingency allowance covers:

- A. Unexpected minor delays
- B. Planned machine maintenance
- C. Fabric colour variation
- D. Garment design changes

Answer: A

12. Capacity study is used to determine:

- A. Fabric quality
- B. Production capability of men and machines
- C. Garment price
- D. Pattern efficiency

Answer: B

13. One major benefit of capacity study is:

- A. Improved production planning
- B. Increased fabric wastage
- C. Reduced quality
- D. Increased machine idle time

Answer: A

14. Operator performance is commonly measured by:

- A. Efficiency and productivity
- B. Fabric colour
- C. Garment style
- D. Machine age

Answer: A

15. WIP stands for:

- A. Work In Progress
- B. Work Inspection Plan
- C. Worker Improvement Process
- D. Work Instruction Procedure

Answer: A

16. Excessive WIP usually results in:

- A. Faster production flow
- B. Increased inventory and production delays
- C. Better productivity
- D. Lower production cost

Answer: B

17. An Operation Bulletin contains:

- A. Details of operations, SMV, machines, and manpower
- B. Customer complaints
- C. Sales reports
- D. Fabric inspection records

Answer: A

18. Line balancing aims to:

- A. Equalize workload among operators
- B. Increase idle time
- C. Increase bottlenecks
- D. Reduce production targets

Answer: A

19. Motion study is the:

- A. Study of work movements to improve efficiency
- B. Study of fabric properties
- C. Study of garment colours
- D. Study of machine prices

Answer: A

20. The main objective of motion study is to:

- A. Eliminate unnecessary movements
- B. Increase worker fatigue
- C. Increase production cost
- D. Increase handling time

Answer: A

21. Which of the following is a benefit of motion study?

- A. Reduced productivity
- B. Improved work efficiency
- C. Increased operator fatigue
- D. Higher material waste

Answer: B

Section II – Analytical MCQs (9 × 2 = 18 Marks)

22. An operator's observed time is 1.20 minutes. After applying the rating factor and allowances, the SAM becomes 1.50 minutes. Why are allowances added?

- A. To reduce production
- B. To account for fatigue, personal needs, and unavoidable delays
- C. To increase machine speed
- D. To reduce operator efficiency

Answer: B

23. A factory has excessive garment bundles waiting between operations. Which activity would best reduce WIP?

- A. Increase fabric inventory
- B. Improve line balancing and workflow
- C. Increase overtime
- D. Reduce quality inspections

Answer: B

24. During a capacity study, it is found that sewing machines remain idle for long periods because operators cannot supply enough work. What should management improve first?

- A. Fabric colour
- B. Operator training and work methods
- C. Packaging process
- D. Marketing strategy

Answer: B

25. A sewing operator operates two automatic machines simultaneously. Which allowance should be considered while calculating SAM?

- A. Relaxation allowance

- B. Interference allowance
- C. Special allowance
- D. Process allowance

Answer: B

26. A production engineer prepares an operation bulletin before starting production. What is its main purpose?

- A. To schedule machine maintenance
- B. To provide operation sequence, machine requirement, and SMV
- C. To record sales
- D. To calculate garment prices

Answer: B

27. A factory improves line balancing and reduces operator waiting time. Which result is most likely?

- A. Lower productivity
- B. Improved operator efficiency and production output
- C. Increased WIP
- D. Higher material wastage

Answer: B

28. During motion study, an operator is observed making unnecessary hand movements while picking garment pieces. What is the best corrective action?

- A. Increase production target
- B. Rearrange the workplace to reduce unnecessary movements
- C. Increase machine speed
- D. Add more operators

Answer: B

29. A garment factory wants to accept a new order. Before confirming, management conducts a capacity study. Why?

- A. To determine whether available resources can complete the order on time
- B. To select fabric colours
- C. To calculate garment selling price
- D. To prepare marketing plans

Answer: A

30. A sewing line has a high SAM, poor operator performance, excessive WIP, and unbalanced operations. Which combination of Industrial Engineering techniques would provide the best improvement?

- A. Capacity Study, Line Balancing, Motion Study, and Operator Training
- B. Fabric Inspection and Pattern Grading
- C. Marker Planning and Dyeing
- D. Packaging and Shipping

Answer: A

Part – B

Descriptive Questions (4 × 10 = 40 Marks)

1. Define Standard Allowed Minute (SAM). Explain the procedure for calculating SAM and discuss the importance of rating factors and allowances in garment manufacturing.
2. Explain the different types of allowances used in time study, namely Machine, Relaxation, Interference, Process, Contingency, and Special Allowances.
3. Define Capacity Study. Explain its procedure and discuss the benefits of capacity study in apparel production planning and control.
4. Define Motion Study. Explain its objectives, uses, and importance in improving operator performance, managing Work-in-Process (WIP), and achieving effective line balancing.

Analytical Descriptive Question (1 × 12 = 12 Marks)

5. A garment factory receives a large export order but faces problems such as high Standard Allowed Minute (SAM), low operator performance, excessive Work-in-Process (WIP), frequent bottlenecks, and poor line balancing. Analyze and recommend suitable measures involving capacity study, motion study, operation bulletin preparation, and line balancing to improve productivity and meet the delivery schedule.

UNIT IV: ERGONOMICS & SCIENTIFIC METHOD OF TRAINING (SMT)

Part – A

Section I – Multiple Choice Questions (21 × 1 = 21 Marks)

1. Ergonomics is the science of:

- A. Fashion designing
- B. Fitting the job to the worker
- C. Marketing garments
- D. Fabric testing

Answer: B

2. The primary objective of ergonomics is to:

- A. Increase worker fatigue
- B. Improve worker comfort, safety, and productivity
- C. Increase production cost
- D. Reduce machine speed

Answer: B

3. Which of the following is an importance of ergonomics?

- A. Reduces operator fatigue
- B. Increases workplace accidents
- C. Increases material wastage
- D. Reduces product quality

Answer: A

4. Ergonomics mainly studies the relationship between:

- A. Fabric and garments
- B. Workers, machines, and the work environment
- C. Customers and retailers
- D. Machines and electricity

Answer: B

5. Which of the following is a division of ergonomics?

- A. Physical ergonomics
- B. Cognitive ergonomics
- C. Organizational ergonomics
- D. All of the above

Answer: D

6. Ergonomic workplace design aims to:

- A. Increase unnecessary movements
- B. Reduce worker discomfort and improve efficiency
- C. Increase operator fatigue
- D. Reduce production planning

Answer: B

7. A properly designed workstation should:

- A. Force workers to bend frequently
- B. Match the worker's body dimensions
- C. Be the same height for every operator
- D. Increase reaching distance

Answer: B

8. Which ergonomic principle helps reduce unnecessary movements?

- A. Proper workplace layout
- B. Increasing machine speed
- C. Increasing work pressure
- D. Reducing lighting

Answer: A

9. Proper material handling helps to:

- A. Increase production delays
- B. Reduce physical strain and improve workflow
- C. Increase labour cost
- D. Increase material wastage

Answer: B

10. Ergonomically designed tools should be:

- A. Heavy and difficult to handle
- B. Comfortable, safe, and easy to use
- C. Expensive only
- D. Decorative

Answer: B

11. Which environmental factor affects worker efficiency?

- A. Lighting
- B. Ventilation
- C. Temperature
- D. All of the above

Answer: D

12. Poor ergonomic conditions in a garment factory may result in:

- A. Higher productivity
- B. Worker fatigue and musculoskeletal disorders
- C. Better work quality
- D. Reduced absenteeism

Answer: B

13. Which of the following is an ergonomic condition related to the garment industry?

- A. Adjustable seating
- B. Proper lighting
- C. Adequate ventilation
- D. All of the above

Answer: D

14. SMT stands for:

- A. Standard Machine Technique
- B. Scientific Management Techniques
- C. Sewing Method Training
- D. Standard Manufacturing Technology

Answer: B

15. The main aim of SMT is to:

- A. Increase production cost
- B. Improve productivity through scientific work methods
- C. Increase worker fatigue
- D. Reduce production planning

Answer: B

16. The methodology behind SMT includes:

- A. Observation and analysis of work methods
- B. Random assignment of work
- C. Ignoring worker performance
- D. Eliminating supervision

Answer: A

17. Which activity is commonly performed during SMT implementation?

- A. Method study
- B. Time study
- C. Work measurement
- D. All of the above

Answer: D

18. A selection test is mainly conducted to:

- A. Select suitable employees for a specific job
- B. Measure fabric quality
- C. Calculate garment cost
- D. Prepare production schedules

Answer: A

19. Selection tests help organizations to:

- A. Improve employee-job matching
- B. Increase absenteeism
- C. Increase production delays
- D. Reduce product quality

Answer: A

20. Which of the following is an advantage of ergonomics in garment manufacturing?

- A. Improved operator health
- B. Reduced fatigue
- C. Increased productivity
- D. All of the above

Answer: D

21. Scientific Management Techniques contribute to:

- A. Efficient resource utilization
- B. Reduced productivity
- C. Increased idle time
- D. Poor work methods

Answer: A

Section II – Analytical MCQs (9 × 2 = 18 Marks)

22. A sewing operator frequently complains of back pain after long working hours. Which ergonomic improvement is most appropriate?

- A. Increase production targets
- B. Provide an adjustable chair and correct table height
- C. Increase overtime
- D. Reduce lighting

Answer: B

23. A garment factory installs better lighting and ventilation, resulting in fewer worker errors and less fatigue. Which ergonomic principle is being applied?

- A. Workplace environment improvement
- B. Material handling
- C. Pattern grading
- D. Marker planning

Answer: A

24. A factory notices workers spend extra time reaching for scissors and garment pieces. What is the best ergonomic solution?

- A. Increase work hours
- B. Rearrange tools within easy reach
- C. Increase machine speed
- D. Reduce operator training

Answer: B

25. During recruitment, a factory conducts skill and aptitude tests before assigning sewing operators to production lines. This is an example of:

- A. Material handling
- B. Selection testing

- C. Motion study
- D. Capacity planning

Answer: B

26. An Industrial Engineer studies work methods, measures operation time, and improves the production process. Which concept is being applied?

- A. Scientific Management Techniques
- B. Fabric inspection
- C. Fashion forecasting
- D. Marker planning

Answer: A

27. A factory introduces ergonomically designed scissors that require less hand force. What is the most likely outcome?

- A. Increased operator fatigue
- B. Reduced fatigue and improved productivity
- C. Increased production cost only
- D. Lower product quality

Answer: B

28. A production manager redesigns the sewing workstation so materials move smoothly with minimum operator movement. Which ergonomic principle is being followed?

- A. Efficient workplace and material handling design
- B. Fabric utilization
- C. Machine maintenance
- D. Inventory control

Answer: A

29. A garment factory experiences high absenteeism due to worker fatigue and discomfort. Which combination of improvements is most appropriate?

- A. Better seating, proper lighting, and improved ventilation
- B. Longer working hours
- C. Increased production targets
- D. Reduced rest breaks

Answer: A

30. A garment factory adopts Scientific Management Techniques by introducing method study, time study, ergonomic workstation design, and employee selection tests. Which outcome is most likely?

- A. Lower productivity and higher fatigue
- B. Improved productivity, efficiency, and worker satisfaction
- C. Increased production delays
- D. Increased material wastage

Answer: B

Part – B

Descriptive Questions (4 × 10 = 40 Marks)

1. Define ergonomics. Explain its importance and describe the different divisions of ergonomics with suitable examples from the garment industry.
2. Explain the ergonomic principles used in designing workplaces, working processes, material handling systems, tools, and the work environment in the apparel industry.
3. Describe the ergonomic conditions required in a garment manufacturing unit and explain how ergonomics improves worker health, safety, and productivity.
4. Define Scientific Management Techniques (SMT). Explain the aims, methodology, and importance of selection tests in apparel manufacturing.

Analytical Descriptive Question (1 × 12 = 12 Marks)

5. A garment factory has reported low productivity, high worker fatigue, poor posture, frequent absenteeism, and increased defects in sewing operations. As an Industrial Engineer, analyze the ergonomic problems in the factory and recommend suitable improvements in workplace design, working processes, material handling, tools, work environment, and Scientific Management Techniques (SMT). Explain how these improvements would enhance productivity, worker safety, and product quality.

UNIT V: PRODUCTION PLANNING

Part – A

Section I – Multiple Choice Questions (21 × 1 = 21 Marks)

1. Production planning is the process of:

- A. Selling finished garments
- B. Planning and organizing production activities to meet customer demand
- C. Purchasing sewing machines only
- D. Inspecting finished garments

Answer: B

2. The main objective of production planning is to:

- A. Increase production delays
- B. Ensure smooth production with optimum use of resources
- C. Increase inventory
- D. Reduce product quality

Answer: B

3. Plant capacity refers to:

- A. The size of the factory building
- B. The maximum production output a plant can achieve under normal conditions
- C. The number of workers in a factory
- D. The amount of raw material purchased

Answer: B

4. Committed capacity is the:

- A. Maximum possible production capacity
- B. Capacity already allocated to confirmed customer orders
- C. Idle production capacity
- D. Machine maintenance capacity

Answer: B

5. Available capacity is the:

- A. Capacity remaining after committed orders are deducted
- B. Total machine capacity
- C. Maximum plant capacity
- D. Future production capacity

Answer: A

6. Potential capacity refers to:

- A. Capacity available under ideal operating conditions
- B. Daily attendance of workers
- C. Quantity of finished garments
- D. Material handling capacity

Answer: A

7. Required capacity is determined by:

- A. Customer demand and production requirements
- B. Factory location
- C. Fabric color
- D. Garment packaging

Answer: A

8. Individual operation capacity refers to:

- A. Capacity of the entire factory
- B. Capacity of a specific operation or workstation
- C. Capacity of the warehouse
- D. Capacity of the marketing department

Answer: B

9. Excess capacity means:

- A. Capacity that exceeds production requirements
- B. Lack of production capacity
- C. Shortage of labour
- D. High inventory level

Answer: A

10. Which factor directly affects plant capacity?

- A. Number of machines
- B. Number of workers
- C. Working hours
- D. All of the above

Answer: D

11. Production standards are mainly used to:

- A. Determine standard production performance

- B. Increase material waste
- C. Reduce product quality
- D. Increase inventory

Answer: A

12. Production standards help in:

- A. Capacity planning
- B. Labour planning
- C. Production scheduling
- D. All of the above

Answer: D

13. Inventory control is the process of:

- A. Managing the storage and movement of materials efficiently
- B. Increasing stock unnecessarily
- C. Selling finished garments
- D. Designing garments

Answer: A

14. The main objective of inventory control is to:

- A. Maintain optimum stock levels
- B. Maximize inventory
- C. Eliminate production planning
- D. Increase storage costs

Answer: A

15. EOQ stands for:

- A. Economic Order Quantity
- B. Estimated Order Quality
- C. Effective Order Quantity
- D. Economic Operating Quality

Answer: A

16. The purpose of EOQ is to:

- A. Determine the most economical order quantity
- B. Increase ordering cost

- C. Increase storage cost
- D. Eliminate inventory

Answer: A

17. EOQ helps to minimize:

- A. Ordering cost and carrying cost
- B. Fabric wastage only
- C. Machine maintenance cost
- D. Labour cost only

Answer: A

18. Which inventory cost increases when order quantity becomes very large?

- A. Ordering cost
- B. Carrying (holding) cost
- C. Transportation cost
- D. Labour cost

Answer: B

19. Which inventory cost decreases when order quantity increases?

- A. Carrying cost
- B. Ordering cost
- C. Machine cost
- D. Utility cost

Answer: B

20. Excess inventory generally results in:

- A. Higher storage cost
- B. Better inventory turnover
- C. Lower carrying cost
- D. Faster production only

Answer: A

21. Which of the following is essential for effective production planning?

- A. Accurate demand forecasting
- B. Capacity planning
- C. Inventory control

D. All of the above

Answer: D

Section II – Analytical MCQs (9 × 2 = 18 Marks)

22. A garment factory has a plant capacity of 12,000 garments per month. It has already committed 8,000 garments to customer orders. What is the available capacity?

- A. 2,000 garments
- B. 4,000 garments
- C. 8,000 garments
- D. 12,000 garments

Answer: B

23. A factory receives an urgent order that requires more production than its available capacity. Which type of capacity planning issue does this represent?

- A. Excess capacity
- B. Capacity shortage
- C. Inventory control
- D. EOQ

Answer: B

24. A sewing department can produce 500 shirts per day, while the cutting department produces only 350 shirts per day. Which department limits the overall production capacity?

- A. Sewing department
- B. Cutting department
- C. Packing department
- D. Finishing department

Answer: B

25. A factory has excess capacity during the off-season. Which action would best utilize this capacity?

- A. Stop production completely
- B. Accept additional customer orders or produce for stock
- C. Reduce machine maintenance
- D. Increase material wastage

Answer: B

26. A factory introduces standard operation times (production standards) for every operation. What is the primary benefit?

- A. Better capacity planning and production scheduling
- B. Increased inventory
- C. Reduced machine utilization
- D. Higher material waste

Answer: A

27. A garment factory frequently experiences stock shortages because raw materials are ordered too late. Which inventory control concept should be improved?

- A. Economic Order Quantity (EOQ)
- B. Fabric inspection
- C. Pattern grading
- D. Motion study

Answer: A

28. A company increases its order quantity to reduce ordering costs, but storage expenses rise significantly. Which inventory cost has increased?

- A. Ordering cost
- B. Carrying (holding) cost
- C. Machine cost
- D. Labour cost

Answer: B

29. A factory plans production based on customer demand, available machines, and labour capacity. Which production planning activity is being performed?

- A. Capacity planning
- B. Fabric testing
- C. Marker planning
- D. Pattern drafting

Answer: A

30. A garment manufacturer wants to improve production efficiency while minimizing inventory costs and ensuring timely order delivery. Which combination of practices would best achieve this objective?

- A. Capacity planning, production standards, inventory control, and EOQ
- B. Fabric inspection and garment washing
- C. Pattern grading and fashion forecasting
- D. Packaging and transportation only

Answer: A

Part – B

Descriptive Questions (4 × 10 = 40 Marks)

1. Define production planning. Explain its objectives and discuss the importance of plant capacity in garment manufacturing.
2. Explain the different types of capacity, namely committed capacity, available capacity, potential capacity, required capacity, individual operation capacity, and excess capacity, with suitable examples.
3. Describe the relationship between production standards and capacity planning. Explain how production standards improve production efficiency.
4. Define inventory control. Explain the concept of Economic Order Quantity (EOQ) and discuss its advantages in apparel production.

Analytical Descriptive Question (1 × 12 = 12 Marks)

5. A garment factory receives several export orders during the peak season. The factory has limited available capacity, uneven operation capacities across departments, excess inventory of some materials, and shortages of others. As a production planner, analyze the situation and recommend suitable strategies involving capacity planning, production standards, inventory control, and Economic Order Quantity (EOQ) to improve production efficiency and ensure timely delivery of customer orders.