

# Question Paper

## Operations Management - I (MB2E3): January 2009

- Answer all 93 questions.
- Marks are indicated against each question.

**Total Marks : 100**

1. The quantity of a product or a service that buyers are able and willing to purchase during a particular time period, in a specific market environment is known as [<Answer>](#)
- (a) Production
  - (b) Sales
  - (c) Aggregate supply
  - (d) Demand
  - (e) Marginal contribution.
- (1 mark)** [<Answer>](#)
2. Operations managers should manage not merely its operations but also the structure of their organization. Which of the following are the issues included in a structure? [<Answer>](#)
- I. Different plants of the organization and their locations.
  - II. Equipment and technology.
  - III. Human resources management.
  - IV. Design of production process.
- (a) Both (I) and (III) above
  - (b) Both (II) and (IV) above
  - (c) (I), (III) and (IV) above
  - (d) (II), (III) and (IV) above
  - (e) All (I), (II), (III) and (IV) above.
- (1 mark)** [<Answer>](#)
3. Which of the following are the factors affecting process design decisions? [<Answer>](#)
- I. Demand patterns of the product.
  - II. Price level of the product.
  - III. Service flexibility.
  - IV. Degree of automation.
- (a) (I), (II) and (III) above
  - (b) (I), (II) and (IV) above
  - (c) (I), (III) and (IV) above
  - (d) (II), (III) and (IV) above
  - (e) All (I), (II), (III) and (IV) above.
- (1 mark)** [<Answer>](#)
4. A job is more than a list of tasks that a worker has to carry out on a regular basis. Which of the following defines the exclusive duties to complete the main job? [<Answer>](#)
- (a) Skill variety
  - (b) Task identity
  - (c) Task content
  - (d) Task significance
  - (e) Task autonomy.
- (1 mark)** [<Answer>](#)
5. Rajkumar Industries is planning to establish a new plant and looking for a location with good external facilities like housing, shops, community services, communications systems, etc. Which of the following factors should the operations manager consider for taking the location decision in the present context? [<Answer>](#)
- (a) Site cost
  - (b) Suitability of land and climate
  - (c) Availability of amenities
  - (d) Availability of labor and skills
  - (e) Integration with other parts of the organization.
- (1 mark)**

6. The management of Moti Engineering Works determines the number of workers needed to meet each month's output requirements, based on average worker productivity. Workers are laid off when the quantity to be produced is less and are hired when there is an increase in orders. Which of the following is the aggregate planning strategy adopted by Moti Engineering Works? [<Answer>](#)
- (a) Varying production rates through overtime or idle time
  - (b) Subcontracting
  - (c) Back-ordering during high-demand periods
  - (d) Varying the workforce size in response to the output requirements
  - (e) Varying size of inventory.
- (1 mark)** [<Answer>](#)
7. Loss of inventory due to pilferage, spoilage, or breakage in warehouses is a common phenomenon. The cost of obsolescence is accounted in [<Answer>](#)
- (a) Purchase costs
  - (b) Stock-out costs
  - (c) Ordering costs
  - (d) Production costs
  - (e) Carrying costs.
- (1 mark)** [<Answer>](#)
8. In which of the following activity does the purchase manager examine all the products/materials that are being reordered and identifies the product/material that needs an improvement? [<Answer>](#)
- (a) Vendor development
  - (b) Contract negotiation
  - (c) Value analysis
  - (d) Make or buy analysis
  - (e) Selection of suppliers.
- (1 mark)** [<Answer>](#)
9. Operations manager uses different techniques for evaluating a facility location. Which of the following methods attempt at matching the capacity and demand of a firm and thereby minimizing the total shipping costs of the firm? [<Answer>](#)
- (a) Point rating method
  - (b) Transportation method
  - (c) Center of gravity method
  - (d) Analytic Delphi method
  - (e) Cost-profit-volume analysis.
- (1 mark)** [<Answer>](#)
10. Forecasting involves calculated predictions that can be used in the planning and decision-making process. Which of the following forecasting components refers to the repeated pattern of increase and decrease in demand over a period of time? [<Answer>](#)
- (a) Cyclic component
  - (b) Promotional component
  - (c) Irregular component
  - (d) Seasonal component
  - (e) Trend component.
- (1 mark)** [<Answer>](#)
11. The well known Hawthorne studies, conducted by Elton Mayo at Western Electric's Hawthorne plant concluded that the productivity of employee is influenced by [<Answer>](#)
- (a) Physical work conditions
  - (b) Importance and recognition given to employees
  - (c) Job content
  - (d) Work environment
  - (e) Machinery and equipment.
- (1 mark)** [<Answer>](#)
12. In Moghal Restaurant, waiters deliver services to customers in a linear fashion by moving in a queue or in a linear route. Which of the following is the process design adopted by the restaurant? [<Answer>](#)
- (a) Product-focused
  - (b) Process-focused
  - (c) Cellular manufacturing
  - (d) Group technology
  - (e) Work center management system.
- (1 mark)**

13. Which of the following is the correct sequence of the steps involved in the master production schedule? [<Answer>](#)
- I. Obtaining the net requirements for each unit of materials, components, and sub-components, after taking into consideration inventory on hand and inventory on order.
  - II. Determining the gross requirements of materials, components and sub-components for each product in the product line using MRP.
  - III. Revising the preliminary master production schedule to accommodate the inadequacy of materials in inventory, if any.
- (a) (I), (II) and (III) above
  - (b) (I), (III) and (II) above
  - (c) (II), (I) and (III) above
  - (d) (II), (III) and (I) above
  - (e) (III), (I) and (II) above.
- (1 mark)** [<Answer>](#)
14. Job design is a structured process of improving the efficiency and productivity of workers. Which of the following is an objective of job design that focuses on the selection and training of the employees to achieve the goals and objectives set forth by the organization? [<Answer>](#)
- (a) Behavioral feasibility
  - (b) Job specialization
  - (c) Technical feasibility
  - (d) Worker motivation
  - (e) Economic feasibility.
- (1 mark)** [<Answer>](#)
15. For an automobile company, average sale for a component is 500 units. The average increase over a period of time was 60 units per month. During the month of May, the company sold 525 units. Using the trend adjusted exponential smoothing method with smoothing constants  $\alpha = 0.25$ ,  $\beta = 0.15$ , the forecasted sales for the month of July is [<Answer>](#)
- (a) 234 units
  - (b) 346 units
  - (c) 496 units
  - (d) 569 units
  - (e) 669 units.
- (3 marks)** [<Answer>](#)
16. Division of labor or specialization is an outcome of [<Answer>](#)
- (a) Henry Ford's works on moving assembly line
  - (b) Industrial revolution
  - (c) Scientific management
  - (d) Operations research
  - (e) Hawthorne studies.
- (1 mark)** [<Answer>](#)
17. Which of the following production processes is referred to as *line flow production system*? [<Answer>](#)
- (a) Group technology
  - (b) Process-focused
  - (c) Cellular manufacturing
  - (d) Product-focused
  - (e) Intermittent.
- (1 mark)** [<Answer>](#)
18. Computerization has significantly improved the production process. Which of the following is **not true** regarding advantages of computerization in the production process? [<Answer>](#)
- (a) Rise in quality of products
  - (b) Reduction in labor costs
  - (c) Lower maintenance costs
  - (d) Reduction in wastage
  - (e) Greater efficiency of the production process.
- (1 mark)**

19. The simplex method was developed by George Dantzing. This method overcomes the limitations of the graphical method. Which of the following statements is/are **not true** regarding the algorithm of simplex method? [<Answer>](#)
- I. The algorithm of the simplex method moves from one extreme point to a better extreme point.
  - II. It examines all sub-optimal extreme points.
  - III. The algorithm detects whether the problem is infeasible, unbounded or has multiple solutions.
- (a) Only (I) above
  - (b) Only (II) above
  - (c) Only (III) above
  - (d) Both (I) and (II) above
  - (e) Both (I) and (III) above.
- (1 mark) [<Answer>](#)
20. A technique called 'coding' is used when developing trend component in time series forecasting method. Which of the following refers to this technique? [<Answer>](#)
- (a) Calculation of moving total for the time series
  - (b) Calculation of the mean of all sample times and subtracting it from each of the sample times
  - (c) Calculation of the moving average of the time series
  - (d) Calculation of modified mean
  - (e) Centering the moving averages.
- (1 mark) [<Answer>](#)
21. An effective job design ensures that jobs are consistent with the organization's goals. Mr. Richard Hackman and Greg Oldham developed most prominent job design model known as Job Characteristics Model. As per Job Characteristics Model, 'task significance' indicates [<Answer>](#)
- (a) The influence of the job on individuals inside and outside the organization
  - (b) The range of skills required to fulfill the task
  - (c) The individual tasks needed to complete the main task
  - (d) The independence that is available to the employee
  - (e) The level of information given back to the employee.
- (1 mark) [<Answer>](#)
22. Raman Engineering Works is engaged in manufacturing of various types of engine components. The company used to procure a special type of sub-assembly component from vendors at a price of Rs.280/- per unit. The company is now planning to make them. For installation of production equipment, the fixed cost is estimated to be Rs.75,000, and variable cost Rs.50/- per unit. In case of in-house production, it is economical to produce not less than [<Answer>](#)
- (a) 106 units
  - (b) 226 units
  - (c) 326 units
  - (d) 436 units
  - (e) 516 units.
- (1 mark) [<Answer>](#)
23. The material requirements plan is needed to produce or purchase the necessary components that are needed to meet the requirements of final assembly components. Which of the following is/are needed to be developed to obtain a material requirement plan? [<Answer>](#)
- I. Capacity requirement plan.
  - II. Master production schedule.
  - III. Aggregate plan.
- (a) Only (I) above
  - (b) Only (II) above
  - (c) Both (I) and (II) above
  - (d) Both (II) and (III) above
  - (e) All (I), (II) and (III) above.
- (1 mark)

24. The Predetermined Motion Time Studies (PMTS) are useful in

[<Answer>](#)

- I. Developing work standards.
- II. Control and auditing.
- III. Benchmarking and performance evaluation.

- (a) Only (III) above
- (b) Both (I) and (II) above
- (c) Both (I) and (III) above
- (d) Both (II) and (III) above
- (e) All (I), (II) and (III) above.

**(1 mark)**

[<Answer>](#)

25. The production system of Sagar Automobiles needs greater employee skill, more employees training, more supervision and complex production control. Which of the following production systems can be adopted by Sagar Automobiles?

- (a) Group technology production system
- (b) Process-focused production system
- (c) Discrete unit manufacturing
- (d) Product-focused production system
- (e) Cellular manufacturing.

**(1 mark)**

[<Answer>](#)

26. Capital is one of the important resources required for setting up an organization. In general, which of the following production systems require huge initial investment for setting up?

- I. Group technology.
- II. Process manufacturing.
- III. Process-focused.
- IV. Discrete unit manufacturing.

- (a) Both (I) and (II) above
- (b) Both (I) and (III) above
- (c) Both (I) and (IV) above
- (d) Both (II) and (IV) above
- (e) Both (III) and (IV) above.

**(1 mark)**

[<Answer>](#)

27. Intel Corporation, USA, has superior computer chip design due to its high technological capability in producing microchips. In this context, the distinct competence of Intel Corporation is

- (a) Volume flexibility
- (b) Production flexibility
- (c) Shorter product cycle
- (d) Quick delivery
- (e) Product/Process expertise.

**(1 mark)**

[<Answer>](#)

28. Managers use different techniques for setting work standards. Which of the following is **not** a work measurement technique?

- (a) Standard data
- (b) Delphi method
- (c) Predetermined motion time study
- (d) Historical analysis
- (e) Employee self-timing.

**(1 mark)**

[<Answer>](#)

29. When taking decisions regarding locations, Operations Manager needs to look into the future of the company. In which of the following location selection methods does a coordinating panel use a questionnaire to draw out information from the forecasting panel regarding future trends, threats and opportunities?

- (a) Point rating method
- (b) Transportation method
- (c) Center of gravity method
- (d) Analytic Delphi method
- (e) Cost-profit-volume analysis.

**(1 mark)**

[<Answer>](#)

30. In which of the following strategies of aggregate planning, current order commitments are fulfilled in the future, assuming customers are willing to wait for delivery?

- (a) Backorder strategy
- (b) Varying the utilization of the workforce strategy
- (c) Varying the size of inventory strategy
- (d) Varying the workforce size strategy
- (e) Subcontracting strategy.

**(1 mark)**

[<Answer>](#)

31. Raj Kumar Industries Ltd., has four factories and four warehouses. The transportation cost per unit is given as below.

Factory	Warehouse				Supply (units)
	W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	W <sub>4</sub>	
F <sub>1</sub>	40	60	73	33	150
F <sub>2</sub>	28	48	30	40	110
F <sub>3</sub>	58	25	45	67	135
F <sub>4</sub>	35	27	53	60	130
Requirement (units)	170	95	140	120	525

Using least cost method the transportation cost for the given matrix is

- (a) Rs.11,315/
- (b) Rs.13,115/
- (c) Rs.15,115/
- (d) Rs.17,215/
- (e) Rs.19,215/.

**(2marks)**

[<Answer>](#)

32. Inventory refers to the stock of goods. It consists of various types of goods. Which of the following refers to the semi-finished goods that are stored temporarily during the production process?

- I. Raw material.
- II. Work-in-process.
- III. Finished goods.

- (a) Only (I) above
- (b) Only (II) above
- (c) Only (III) above
- (d) Both (I) and (II) above
- (e) Both (II) and (III) above.

**(1 mark)**

[<Answer>](#)

33. Assembly charts are used to obtain a general understanding of the entire process involved in producing products. In assembly charts, operations are indicated by

- (a) Squares
- (b) Rectangles
- (c) Circles
- (d) Diamond symbols
- (e) Rhombus.

**(1 mark)**

[<Answer>](#)

34. Which of the following document is provided by the suppliers, in which they specify the price of material, the delivery schedule, the mode of transportation and terms and conditions?

- (a) Request for quotation
- (b) Invoice
- (c) Indent
- (d) Purchase order
- (e) Quotation.

**(1 mark)**

[<Answer>](#)

35. The transportation problem is a special case of linear programming. The initial feasible solution of a transportation problem can be developed by different methods. Which of the following is a best method for finding initial feasible solution that helps in deriving an optimal or near optimal solution for a transportation problem?

- (a) Simplex method
- (b) Vogel's approximation method
- (c) Stepping stone method
- (d) Least cost method
- (e) North-west corner method.

**(1 mark)**

[<Answer>](#)

36. Different types of forecasting models help the operations manager in calculating the demand. Which of the following is an 'adaptive forecasting model'?

- (a) Delphi method
- (b) Nominal group technique
- (c) Deseasonalized trend method
- (d) Simple moving average method
- (e) Linear regression method.

**(1 mark)**

[<Answer>](#)

37. Which of the following statements are **true** regarding employee self-timing, a technique of work measurement?

- I. It is a costly affair.
- II. It requires minimum training of employees.
- III. It considers various allowances.
- IV. It needs a lot of time for recording and sorting data.

- (a) Both (I) and (II) above
- (b) Both (I) and (III) above
- (c) Both (II) and (IV) above
- (d) (I), (II) and (IV) above
- (e) (II), (III) and (IV) above.

**(1 mark)**

[<Answer>](#)

38. Which of the following statements are **true** regarding customized product design?

- I. It is used when the level of customization is high.
- II. It is used when the quantity produced is high.
- III. It provides importance to cost control.
- IV. It focuses on the quality of the product.

- (a) Both (I) and (IV) above
- (b) Both (II) and (III) above
- (c) (I), (II) and (III) above
- (d) (II), (III) and (IV) above
- (e) All (I), (II), (III) and (IV) above.

**(1 mark)**

[<Answer>](#)

39. Which of the following statements is **not** a condition to be satisfied for work measurement?

- (a) The worker should be an average performer
- (b) The job should be measurable
- (c) The selected job should use different types of tools and materials
- (d) The job should have a definite start time
- (e) The job should have a definite end time.

**(1 mark)**

[<Answer>](#)

40. All the manufacturing and service organizations need to carefully evaluate the location for setting up their plants and service facilities because location will have a serious effect on the success of an organization. Which of the following are the location evaluation techniques used by an Operations Manager?

- I. Center of gravity method.
  - II. Computer search models.
  - III. Analytic Delphi method.
  - IV. Critical ratio method.
- (a) Both (I) and (III) above
  - (b) Both (II) and (IV) above
  - (c) (I), (II) and (III) above
  - (d) (I), (III) and (IV) above
  - (e) (II), (III) and (IV) above.

**(1 mark)**

[<Answer>](#)

41. Organizations develop a set of rules and guidelines to ensure that their purchasing personnel conduct business in an ethical manner. Which of the following is an unethical practice in buying?

- (a) Keeping organization's interest in mind while purchasing
- (b) Conducting all purchasing activities honestly and truthfully
- (c) Selecting suppliers on merit
- (d) Accepting free gifts from suppliers
- (e) Completing all purchasing commitments on time.

**(1 mark)**

[<Answer>](#)

42. Which of the following method is used to generate a regression model by assigning data to a single line?

- (a) Least square method
- (b) Simple moving average
- (c) Exponential smoothing method
- (d) Transportation method
- (e) Constrained optimization method.

**(1 mark)**

[<Answer>](#)

43. Which of the following is/are the valid reason(s) for using simulation?

- I. Low costs associated with a computer based simulation exercise.
  - II. Ability to analyze complex situations.
  - III. Convenience of conducting experiments without disrupting the real system.
- (a) Only (III) above
  - (b) Both (I) and (II) above
  - (c) Both (I) and (III) above
  - (d) Both (II) and (III) above
  - (e) All (I), (II) and (III) above.

**(1 mark)**

[<Answer>](#)

44. Organizations incur various costs in the process of producing a product in-house. Setup cost is to be accounted in

- (a) Purchase costs
- (b) Carrying costs
- (c) Holding costs
- (d) Ordering costs
- (e) Opportunity costs.

**(1 mark)**



[<Answer>](#)

45. Which of the following statements is/are **true** regarding graphical method of linear programming problem?

- I. Graphical method is applicable only for the problems in which a maximum of two decision variables are involved.
- II. The inequality constraints are to be converted into equalities.
- III. When the objective function is parallel to one of the sides of the feasible region, then different points on the line result in different values for the objective function.

- (a) Only (I) above
- (b) Only (II) above
- (c) Only (III) above
- (d) Both (I) and (II) above
- (e) All (I), (II) and (III) above.

**(1 mark)**

[<Answer>](#)

46. Capacity planning is important for any organization. But measuring capacity is not an easy task. Which of the following statements is/are **true** regarding capacity measurement?

- I. Capacity is measured in terms of inputs.
- II. Capacity is also measured in terms of outputs.
- III. Organizations with multitude of products in its product portfolio measure their capacity as the number of units per a given operating period.

- (a) Only (I) above
- (b) Only (II) above
- (c) Only (III) above
- (d) Both (I) and (II) above
- (e) All (I), (II) and (III) above.

**(1 mark)**

[<Answer>](#)

47. Dexter Ltd., procured automatic drilling machines. It was observed that under normal working conditions, an average worker takes 3 min 42 sec for a unit of output. 3 min 42 sec is referred to as

- (a) Normal time
- (b) Work standard
- (c) Drilling time
- (d) Work sample
- (e) Employee self time.

**(1 mark)**

[<Answer>](#)

48. Which of the following production system is more flexible in producing variety of goods among the other?

- (a) Job shop system
- (b) Product-focused dedicated system
- (c) Discrete unit manufacturing system
- (d) Cellular manufacturing system
- (e) Delivery of services system.

**(1 mark)**

[<Answer>](#)

49. Which of the following method is used to find the dispersion of observed values around the expected values?

- (a) Least square method
- (b) Weighted moving average
- (c) Mean absolute deviation
- (d) Simple moving average
- (e) Trend adjusted exponential smoothing.

**(1 mark)**

[<Answer>](#)

50. Which of the following objectives of the job design emphasize(s) that ‘the set of duties or tasks assigned to a worker should be designed to keep the workload at a convenient level, i.e. the workload for each worker should be within the reasonable limits of his skills, and physical and mental ability’?

- I. Behavioral feasibility.
  - II. Technical feasibility.
  - III. Economic feasibility.
- (a) Only (I) above
  - (b) Only (II) above
  - (c) Only (III) above
  - (d) Both (I) and (III) above
  - (e) All (I), (II) and (III) above.

(1 mark)

[<Answer>](#)

51. Transportation problem is a special case of linear programming. A transportation problem can be either balanced or unbalanced. Which of the following statements is **true** for an unbalanced transportation problem?

- (a) A dummy warehouse added if the production capacity is less
- (b) Both dummy origin and dummy warehouse are added if the production capacity is less
- (c) A dummy origin is added if the production capacity is less and a dummy warehouse is added if the production capacity is more
- (d) Both dummy origin and dummy warehouse are added if production capacity is more
- (e) A feasible solution is obtained when the number of occupied cells in the solution is  $(m+n)$ .

(1 mark)

[<Answer>](#)

52. A company’s annual requirement is 10,000 units. The ordering cost is Rs.200 per order, carrying cost is Rs.25 per unit, lead time is 12 days. The number of working days is assumed to be 285. The EOQ and reorder point (in units) are approximately

- (a) 400, 620
- (b) 350, 450
- (c) 400, 420
- (d) 550, 620
- (e) 300, 420.

(2 marks)

[<Answer>](#)

53. A job design should be beneficial to both employee and employer. Which of the following is **not** an outcome of a job design?

- (a) Increase in motivation
- (b) Improved productivity
- (c) Improved satisfaction
- (d) Improved efficiency
- (e) Increase in worker input.

(1 mark)

[<Answer>](#)

54. Which of the following is **not** an advantage of process layout?

- (a) It provides greater flexibility in production
- (b) It facilitates efficient supervision
- (c) It offers enhanced utilization of men and machines
- (d) It occupies less floor space
- (e) It allows easy expansion of production lines.

(1 mark)

55. The cycle time for the assembly line is 100 sec. The following is the precedence diagram of the assembly line:

The theoretical number of workstations and the actual number of workstations for the above assembly line are

- (a) 2, 4
- (b) 3, 4
- (c) 5, 6
- (d) 6, 6
- (e) 6, 8.

**(2 marks)**

[<Answer>](#)

56. When the price reduces, customers tend to buy large volumes of products/services till a point. How is the curve likely to be affected beyond this point?

- (a) The curve tends to be parabola
- (b) The curve moves in U shape
- (c) The curve becomes almost horizontal
- (d) The curve tends to retard
- (e) The curve after a significant rise, declines abruptly.

**(1 mark)**

[<Answer>](#)

57. In which of the following process designs are dissimilar machines grouped into work centers to work on products similar in shape and process requirements?

- (a) Cellular manufacturing
- (b) Process-focused
- (c) Process manufacturing
- (d) Product-focused
- (e) Group technology.

**(1 mark)**

[<Answer>](#)

58. The effectiveness of purchasing activities can be enhanced by proper organization and coordination of the activities. Which of the following is **true** with regard to decentralized purchasing system?

- (a) The individual departments are flexible to alter its purchasing policy on the basis of specific requirements
- (b) All the purchasing activities are carried out by a separate department
- (c) The benefits of bulk purchasing can be realized
- (d) Uniformity in maintaining purchase records
- (e) It is effective for an organization with a number of production sites.

**(1 mark)**

[<Answer>](#)

59. The following data belongs to a product of Universal Mobile stores:

Demand Forecast (units)	Actual Demand (units)
340	328
341	350
343	336
373	386
352	340
342	347

The accuracy of the forecasting method by Mean Forecast Error is

- (a) - 0.22
- (b) 0.44
- (c) - 0.67
- (d) 0.88
- (e) - 1.22.

(1 mark)

[<Answer>](#)

60. Which of the following statements is **true** regarding Key row in a simplex table?

- (a) Key row is the row where the index value is zero
- (b) Key row is the row with minimum ratio
- (c) Key row is the row where the index value is maximum
- (d) Key row is the row with the maximum ratio
- (e) Key row is the row where the index value is minimum.

(1 mark)

[<Answer>](#)

61. Identifying what work must be performed, how it will be performed, where it is to be performed and who will perform is known as

- (a) Human resource planning
- (b) Division of labour
- (c) Organization structure and design
- (d) Job design
- (e) Time study.

(1 mark)

[<Answer>](#)

62. During the development of a process layout, Jairam Engineering Works developed an initial process layout. With the help of a process layout developing technique, the initial layout was evaluated for its effectiveness and the locations of pairs of process centers were exchanged. Each exchange was evaluated for its effectiveness and the best exchange was adopted. Which of the following is the process layout developing model adopted by Jairam Engineering Works?

- (a) Computerized relative allocation of facilities technique
- (b) Line balancing
- (c) Load distance model
- (d) Mixed-model line balancing
- (e) Graphic and schematic analysis.

(1 mark)

[<Answer>](#)

63. In which of the following methods of work measurement are several random observations used to see the relative frequency with which various elemental activities take place?

- (a) Employee self-timing
- (b) Historical analysis
- (c) Predetermined motion time study
- (d) Standard data
- (e) Work sampling.

(1 mark)

[<Answer>](#)

64. Which of the following is **not** a component of job description?

- (a) Job analysis
- (b) Job duties
- (c) Job specification
- (d) Job identification
- (e) Job title.

(1 mark)

65. Which of the following statements is/are **not true** regarding assumptions of economic order quantity model? [<Answer>](#)
- I. The quantity of inventory ordered is delivered in a single lot.
  - II. Materials are issued in varying quantities to the indenting departments.
  - III. The lead time for material delivery is known with certainty and remains constant.
- (a) Only (I) above
  - (b) Only (II) above
  - (c) Only (III) above
  - (d) Both (I) and (II) above
  - (e) Both (II) and (III) above.
- (1 mark)** [<Answer>](#)
66. The purchase department is one of the key players in achieving the strategic objectives of a firm. Which of the following is **not** a responsibility of a purchase manager? [<Answer>](#)
- (a) Vendor development
  - (b) Selection of suppliers
  - (c) Value analysis
  - (d) Designing the production system
  - (e) Contract negotiation and communication interface.
- (1 mark)** [<Answer>](#)
67. Additivity, the assumption of linear programming says that [<Answer>](#)
- (a) The contribution of individual decision variables in the objective function is proportional to their numeric value
  - (b) Decision variables can be any non-negative and real numeric values within the range specified by the constraints
  - (c) All the constraints have certain values
  - (d) Fractional values can also be allowed
  - (e) The model does not consider any synergistic or anti-synergistic effects among the decision variables while calculating the total value for the objective function.
- (1 mark)** [<Answer>](#)
68. Organizations come up with many reasons for holding inventory at various stages of production. Which of the following is **not** a suitable reason for holding raw material inventory? [<Answer>](#)
- (a) Obtaining from suppliers as and when needed is not always possible
  - (b) Quantity discounts can result from larger purchase quantities
  - (c) Larger shipments can reduce incoming freight and material handling costs
  - (d) Production and transporting in larger batches reduces material-handling and production costs
  - (e) Increase in prices or anticipated scarcity in the future can be managed effectively.
- (1 mark)** [<Answer>](#)
69. A firm should make the facility location and layout decision to improve material flow inside the firm and its overall efficiency. For an organization, selection of facility location is a [<Answer>](#)
- (a) Strategic decision
  - (b) Administrative decision
  - (c) Tactical decision
  - (d) Technical decision
  - (e) Operational decision.
- (1 mark)** [<Answer>](#)
70. In measuring the work in a manufacturing plant, the available fraction of time is observed as 0.75 and the standard time is 1.75 min. The normal time of the work is [<Answer>](#)
- (a) 4.31 min
  - (b) 3.23 min
  - (c) 2.13 min
  - (d) 1.31 min
  - (e) 0.21 min.
- (1 mark)**

71. Operations managers follow different types of inventory systems. In which of the following systems is inventory continuously checked and a new order placed when the level of inventory reaches the reorder point? [<Answer>](#)
- (a) Q-system
  - (b) P-system
  - (c) Fixed order period system
  - (d) EOQ system
  - (e) Fixed time period system.
- (1 mark)** [<Answer>](#)
72. Organizations need to estimate resource requirements so that they can satisfy market demand for their product. Which of the following planning defines the best combination of workforce level, inventory on hand, and production rate that matches the company's resources to market demand? [<Answer>](#)
- (a) Master planning
  - (b) Operations planning
  - (c) Capacity planning
  - (d) Inventory planning
  - (e) Aggregate planning.
- (1 mark)** [<Answer>](#)
73. Work measurement helps operations managers reduce the effort involved in a job by minimizing the unnecessary movements. Which of the following statements are **true** regarding work measurement? [<Answer>](#)
- I. Data from past records is used to determine the standards for common tasks.
  - II. Stopwatch is used to record the time in time study.
  - III. Work measurement is done with the help of statistical tables.
  - IV. Video clip of the job is used in work measurement.
- (a) Both (I) and (II) above
  - (b) Both (II) and (IV) above
  - (c) (I), (II) and (III) above
  - (d) (I), (II) and (IV) above
  - (e) (II), (III) and (IV) above.
- (1 mark)** [<Answer>](#)
74. Regression refers to the functional relationship between two or more correlated variables and expressed in equation as  $Y = a + bX$ . In a linear regression 'b' indicates the [<Answer>](#)
- (a) Slope of the trend line
  - (b) Y intercept
  - (c) Value of dependent variable
  - (d) Value of independent variable
  - (e) Exponential smoothing constant.
- (1 mark)** [<Answer>](#)
75. Graphical method is one of the aggregate output planning models that help planners formulate the aggregate output plan. Which of the following statements is/are **true** regarding graphical method for aggregate output planning? [<Answer>](#)
- I. Horizontal axis shows the number of workers for the planning period.
  - II. Vertical axis represents the cumulative units of output.
  - III. The graph is used to identify the periods of excess inventory and shortages.
- (a) Only (I) above
  - (b) Only (II) above
  - (c) Both (I) and (II) above
  - (d) Both (II) and (III) above
  - (e) All (I), (II) and (III) above.
- (1 mark)** [<Answer>](#)
76. In which of the following work measurement techniques, the timing role of analyst is to record times for several cycles of the tasks, and judge and record pace? [<Answer>](#)
- (a) Time study
  - (b) Standard data
  - (c) Pre-determined time study
  - (d) Work sampling
  - (e) Historical analysis.
- (1 mark)**

[<Answer>](#)

77. Which of the following is **not true** with regard to steps taken by operations manager to modify master production schedule to accommodate imbalances between the actual production output and the actual market demand?

- (a) Modifying the size or composition of the product or service temporarily
- (b) Varying the inventory level accordingly with the demand for the product
- (c) Developing load reports from the planned order releases
- (d) Subcontracting the additional capacity requirements
- (e) Altering the price of products to influence the demand level.

(1 mark)

[<Answer>](#)

78. To exercise proper control over the inventory items, organizations classify and categorize these items. Which of the following inventory classification model is based on the importance of a particular item in the production process?

- (a) VED classification
- (b) FSND classification
- (c) P-system
- (d) ABC classification
- (e) Q-system.

(1 mark)

[<Answer>](#)

79. The broad, long-term plans, framed by organizations for achieving business objectives are known as

- (a) Organizational policies
- (b) Organizational procedures
- (c) Organizational strategies
- (d) Organizational mission
- (e) Organizational vision.

(1 mark)

[<Answer>](#)

80. The initial feasible solution for a transportation problem is given below:

Warehouse	W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>
Factory			
F <sub>1</sub>	13	15	10
F <sub>2</sub>	13	14	16
F <sub>3</sub>	11	16	12
	13	12	15

Using stepping stone method, the net cost change for cell (F<sub>1</sub>W<sub>1</sub>) is

- (a) 4
- (b) -1
- (c) 6
- (d) 3
- (e) 1.

(1 mark)

[<Answer>](#)

81. During world war-II, mathematical techniques were developed to solve complex logistical situations. Which of the following led to the development of these mathematical techniques?

- I. Hawthorne study.
  - II. Operations research.
  - III. Scientific management.
- (a) Only (I) above
  - (b) Only (II) above
  - (c) Only (III) above
  - (d) Both (I) and (II) above
  - (e) All (I), (II) and (III) above.

(1 mark)

[<Answer>](#)

82. The task times for a process are given below.

Task	A	B	C	D	E	F
Task time(Seconds)	45	34	23	28	22	31

The actual number of workstations of the balanced assembly line is 8 and the cycle time of the line is 30 sec. The efficiency of the line is

- (a) 26%
- (b) 46%
- (c) 76%
- (d) 86%
- (e) 96%.

(1 mark)

[<Answer>](#)

83. An automobile company plans to utilize its existing manufacturing facility to produce certain automobile components. For producing the components, the company will incur material cost of Rs.90 per unit, labor costs of Rs.40 per unit and overhead costs of Rs.130 per unit. The annual fixed cost associated with required capacity is Rs.80,000. The sales price is fixed at Rs.450 per unit. If the expected demand for the next year is 700 units, the expected profit for the organization will be

- (a) Rs.95,000
- (b) Rs.83,000
- (c) Rs.75,000
- (d) Rs.68,000
- (e) Rs.53,000.

(1 mark)

[<Answer>](#)

84. The fraction of time that elapses during the delays which is estimated during work measurement is known as

- (a) Standard time
- (b) Pace rate
- (c) Normal time
- (d) Allowance
- (e) Execution time.

(1 mark)

[<Answer>](#)

85. The following information belongs to Ramana Fabrication Works:

Particulars	May	June
Demand (Units)	8,700	9,200
Working days	23	24

Opening stock for May is 490 units. Productivity is 25 units per day, number of workers hired is 15 and the inventory holding cost is Rs.3. Inventory carrying cost for the month of June is

- (a) Rs.335
- (b) Rs.545
- (c) Rs.645
- (d) Rs.855
- (e) Rs.955.

(2marks)

[<Answer>](#)

86. Firms conduct facility location analysis where they evaluate different locations and finally choose an optimum location to start their operations. The following are the circumstances that necessitate the need for selection of facility location, **except**

- (a) When the business is newly started
- (b) When a firm has to design its internal structure to satisfy its production and service requirements
- (c) When a firm wants to establish new branches
- (d) When the landlord does not renew the lease
- (e) When the expansion to the existing plant is not possible.

(1 mark)



87. Skills and qualifications are the important considerations of employees. Which of the following describes the skills and qualifications required to perform the job competently? [<Answer>](#)
- (a) Job title
  - (b) Job identification
  - (c) Job specialization
  - (d) Job duties
  - (e) Job specification.
- (1 mark)**
88. Produce-to-order policy is suitable for organizations manufacturing which of the following types of products? [<Answer>](#)
- I. Seasonal demand products.
  - II. Products meant exclusively for specific purposes.
  - III. Products, parts or components of high value.
  - IV. General application products.
- (a) Both (I) and (II) above
  - (b) Both (II) and (III) above
  - (c) Both (III) and (IV) above
  - (d) (I), (II) and (III) above
  - (e) (II), (III) and (IV) above.
- (1 mark)**
89. Purchase department deals with various types of documents. Which of the following document(s) consist of a clear specification of required materials, quantity required, probable date of requirement, name of the department to which the costs are to be accounted and is approved by an authorized person to undertake the purchase? [<Answer>](#)
- I. Purchase order.
  - II. Purchase requisition.
  - III. Quotation.
  - IV. Request for quotation.
- (a) Only (I) above
  - (b) Only (II) above
  - (c) (I), (II) and (III) above
  - (d) (I), (II) and (IV) above
  - (e) (II), (III) and (IV) above.
- (1 mark)**
90. Which of the following is a stage of product life cycle, where sales volume increases exponentially and organizations take decisions regarding production capacity expansion? [<Answer>](#)
- (a) Maturity
  - (b) Growth
  - (c) Commodity
  - (d) Prototype design
  - (e) Decline.
- (1 mark)**
91. Which of the following components of operations strategy involves selecting the product design, the production system, and the inventory policy for finished goods for each product line? [<Answer>](#)
- (a) Facility planning
  - (b) Technology selection and process development
  - (c) Product/service design and development
  - (d) Designing the production system
  - (e) Allocation of resources to strategic alternatives.
- (1 mark)**

[<Answer>](#)

92. A fertilizer company needs to produce minimum of 240 tons of a mixture consisting of ingredient A and B. The ingredient A costs Rs.4 per ton and B costs Rs.6 per ton. Not more than 80 tons of A can be used and at least 50 tons of B must be used to obtain the minimum cost mixture. Formulate the given information into a linear programming problem.

- (a)  $\text{Min } Z = 4x_1 + 6x_2$ ; sub to  $x_1 + x_2 \geq 240, x_1 \leq 80, x_2 \geq 50, x_1 \geq 0, x_2 \geq 0$
- (b)  $\text{Min } Z = 4x_1 + 6x_2$ ; sub to  $x_1 + x_2 \geq 240, x_1 \geq 80, x_2 \geq 50, x_1 \geq 0, x_2 \geq 0$
- (c)  $\text{Min } Z = 80x_1 + 50x_2$ ; sub to  $x_1 + x_2 \geq 240, x_1 \geq 4, x_2 \geq 6, x_1 \geq 0, x_2 \geq 0$
- (d)  $\text{Min } Z = 80x_1 + 50x_2$ ; sub to  $x_1 + x_2 \geq 240, x_1 \leq 4, x_2 \geq 6, x_1 \geq 0, x_2 \geq 0$
- (e)  $\text{Min } Z = 4x_1 + 6x_2$ ; sub to  $x_1 + x_2 \geq 240, x_1 \leq 80, x_2 \leq 50, x_1 \geq 0, x_2 \geq 0$ .

**(2marks)**

[<Answer>](#)

93. Which of the following systems is specialized in translating CAD design information into instruction for numerically controlled automated machines?

- (a) Computer simulation
- (b) Computer-aided manufacturing
- (c) Automated storage and retrieval
- (d) Manufacturing information systems
- (e) Computer aided design.

**(1 mark)**

**END OF QUESTION PAPER**

## Suggested Answers

### Operations Management - I (MB2E3): January 2009

ANSWER	REASON	
1. D	Demand is the quantity of a product or a service that buyers are able and willing to purchase during a particular time period, in a specific market environment.	<a href="#">&lt;TOP</a>
2. E	The term structure has a broad perspective and includes issues like the number of plants, size of plants and their location, plant capacity, choices of equipment and process technology, production control, work forces management, production process and design etc.	<a href="#">&lt;TOP</a>
3. E	The following factors affect the process design decisions. 1. Nature of demand 2. Degree of vertical integration 3. Flexibility 4. Degree of automation 5. Quality level and degree of customer contact Factors (I) and (II) relate to nature of demand. (III) relate to flexibility.	<a href="#">&lt;TOP</a>
4. B	Task identity defines clearly the identifiable tasks needed to complete the main task.	<a href="#">&lt;TOP</a>
5. C	Availability of amenities is one of the factor that affects the location decisions. Locations with good external amenities such as housing, shops, community services, communications systems, etc. are more attractive than those located in the remote areas.	<a href="#">&lt;TOP</a>
6. D	Varying the workforce size in response to the output requirements: Under this strategy the size of workforce is varied by hiring and laying off workers in direct proportion to demand. The management determines the number of workers needed to meet each month's output requirements, based on average worker productivity. Workers are laid off when the quantity to be produced is less and are hired when there is an increase in orders.	<a href="#">&lt;TOP</a>
7. E	Loss of inventory due to pilferage, spoilage, or breakage in warehouses and the cost of obsolescence are a part of the carrying costs.	<a href="#">&lt;TOP</a>
8. C	In value analysis, the purchase manager examines all the products/materials that are being reordered and identifies each product/material that needs an improvement.	<a href="#">&lt;TOP</a>
9. B	The transportation method of linear programming is one of the most effective techniques for evaluating a facility location. The method attempts at matching the capacity and demand of a firm and thereby minimizing the total transportation costs of the firm. Shipping cost form a part of the total transportation costs. Hence option (b) is the answer.	<a href="#">&lt;TOP</a>
10. D	Seasonal component refers to the repeated pattern of increase and decrease in demand over a period.	<a href="#">&lt;TOP</a>
11. B	Until late 1920s, the developments in operations management only emphasized planning and control of materials and machines, and not on human dimensions. In 1927, a research team from Harvard Business School under the supervision of Elton Mayo, undertook a study at Western Electric's Hawthorne plant in Chicago. Their studies concluded that the productivity is depending on the importance and recognition given to the employees.	<a href="#">&lt;TOP</a>

12. A Delivery of services: Delivery of services can also use a product-focused production system. In such a system, services are administered to customers while they move in a queue or in a linear route. Services delivered by waiters in restaurants make use of this system. [<TOP](#)
13. C The correct sequence of the given steps is as follow. [<TOP](#)
- II. Determining the gross requirements of materials, components and sub-components for each product in the product line using MRP.
- I. Obtaining the net requirements for each unit of materials, components, and sub-components, after taking into consideration inventory on hand and inventory on order.
- III. Revising the preliminary master production schedule to accommodate the inadequacy of materials in inventory, if any.
14. C The objectives of a job design are: [<TOP](#)
- Technical feasibility
    - Economic feasibility
    - Behavioral feasibility
- Technical feasibility focuses on
- Convenient work load
    - Required machinery
    - Required equipment
    - Required training.
15. E From the information given [<TOP](#)
- $\alpha = 0.25$
- $\beta = 0.15$
- Average sales  $A_0 = 500$
- Average increase in sales ( Average trend )  $T_0 = 60$
- Demand in the month of May  $D_1 = 525$
- To forecast sales for the month of June, we will use the equation
- $$A_t = \alpha D_t + (1 - \alpha)(A_{t-1} + T_{t-1})$$
- $$T_t = \beta(A_t - A_{t-1}) + (1 - \beta)(T_{t-1})$$
- $$F_{t+1} = A_t + T_t$$
- $$A_{\text{May}} = 0.25 (525) + (1 - 0.25) (500 + 60) = 131.25 + 420 = 551.25$$
- $$T_{\text{May}} = 0.15 (551.25 - 500) + (1 - 0.15) (60) = 7.6875 + 51 = 58.69$$
- $$F_{\text{June}} = A_{\text{May}} + T_{\text{May}} = 551.25 + 58.6875 = 609.94$$
- $$A_{\text{June}} = 0.25 (609.94) + (1 - 0.25) (551.25 + 58.68) = 152.48 + 457.45 = 609.93$$
- $$T_{\text{June}} = 0.15 (609.93 - 551.25) + (1 - 0.15) (58.69) = 8.80 + 49.89 = 58.69$$
- $$F_{\text{July}} = 609.93 + 58.69 = 668.6 = 669 \text{ units.}$$

16. C Division of labor or work specialization is a development of scientific management. According to Taylor, each worker should be assigned a task based on his or her skill, strength and ability to learn. Dividing the work into sub-tasks, and assigning them to workers based on their individual skills and capabilities, improves the productivity. [<TOP](#)
17. D Product-focused production system is also referred to as line flow production system. [<TOP](#)
18. C Computerization has brought about significant improvement in the production process. It has led to the improvement in the quality of products and services, reduction in labor costs and wastage, increase in the efficiency of the production process, etc. However the high costs of implementation and the level of maintenance required for automated machines has been a major disadvantage in the use of technology in the production process. [<TOP](#)
19. B The following statements are true regarding the algorithm of the simplex method. [<TOP](#)
- The algorithm of the simplex method moves from one extreme point to a better extreme point.
  - The algorithm **skips** many sub-optimal extreme points. The simplex method finds the point where the problem has to be stopped and thereby reduces the effort of verifying for optimality at each and every step.
  - The algorithm detects whether the problem is infeasible, unbounded or has multiple solutions.
20. B Developing trend component: After depersonalizing the time series, a trend component of the time series is calculated. In this process the time variable is converted into a form which would simplify the calculation. This conversion of time variable is accomplished using a technique called coding. In this technique, mean of all the sample times is calculated, and then the resultant value is subtracted from each of the sample times. [<TOP](#)
21. A As per Job Characteristics Model, 'task significance' indicates the influence of the job on individuals inside and outside the organization. [<TOP](#)
22. C Price = Rs.280/- ( Purchase price ) [<TOP](#)  
Fixed cost = Rs.75,000 ( for production )  
Variable cost = Rs.50/- unit  
Assume the break even demand is Q.  
Total purchase price = Unit price X Quantity  
= Rs.280 X Q  
Total production cost = Fixed cost + Variable cost  
= Rs.75,000 + ( 50 ) Q  
At break even point,  
Total production cost = Total purchase cost  
75,000 + ( 50 ) Q = 280 X Q  
230 Q = 75000  

$$Q = \frac{75,000}{230} = 326.087 = 326 \text{ units}$$
If the company's minimum demand is 326 units for the production cycle then only it is economical to go for in-house production.
23. D The master production schedule is a detailed plan translated from aggregate plan and this becomes input to material requirement plan. [<TOP](#)  
Aggregate plan → Master production schedule → Material requirement plan → Capacity requirement plan .

24. E Predetermined Motion Time Studies (PMTS) are useful in developing standards, control and auditing, and benchmarking and performance evaluation. [<TOP](#)
25. B Process-focused production system requires greater employee skill, more employees training, more supervision and complex production control. [<TOP](#)
26. D In general, huge investments are required for setting up a product-focused production system that is dedicated to the production of a particular product. Discrete unit manufacturing and process manufacturing belong to product-focused production systems. Generally these production systems require huge investment. [<TOP](#)
27. E An organization can employ its strengths in certain areas of product functionalities and process capabilities to gain a competitive advantage over its competitors. Intel corporation, USA, has superior computer chip design due to its technological expertise in producing microchips. Here, the company's distinct competence was product/process expertise. [<TOP](#)
28. B Delphi method is not a work measurement technique. It is a forecasting method. [<TOP](#)
29. D In Analytic Delphi method, the coordinating panel uses a questionnaire to draw out information from the forecasting panel regarding future trends, threats and opportunities. [<TOP](#)
30. A In Backorder strategy current order commitments are fulfilled in the future, assuming customers are willing to wait for delivery. [<TOP](#)  
Varying the utilization of the workforce: - Under this strategy the company maintains stable workforce and the utilization of workforce varies according to the demand.

31. E Least- Cost Method

[<TOP](#)

Warehouse Factory	W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	W <sub>4</sub>	Supplies
F <sub>1</sub>	40	60	73	33	150
F <sub>2</sub>	28	48	30	40	110
F <sub>3</sub>	58	25	45	67	135
F <sub>4</sub>	35	27	53	60	130
Demand	170	95	140	120	525

**Algorithm:**

- i) Find least-cost cell in the matrix and allocate as maximum units as possible based on supply and requirement.
- ii) Strike-out either column or row if it is completely satisfied.
- iii) Ignore the cells in the column or row satisfied and consider rest of the cells in matrix to find next least cost and allocate maximum units possible.
- iv) Repeat the above steps till all the units are allocated.

$$\begin{aligned}
 \text{Transportation cost} &= (110 \times 28) + (60 \times 35) + (95 \times 25) + (30 \times 73) + \\
 &\quad (40 \times 45) + (70 \times 53) + (120 \times 33) \\
 &= 3080 + 2100 + 2375 + 2190 + 1800 + 3710 + \\
 &\quad 3960 \\
 &= \text{Rs. } 19,215 \text{ /-}
 \end{aligned}$$

32. B The semi-finished goods that are stored temporarily during the production process are known as work-in-progress goods. [<TOP](#)

33. C In assembly charts, operations are indicated by circles. [<TOP](#)

34. E **Quotation** is a document provided by the suppliers, in which they quote the price per unit of material, the delivery schedule, the mode of transportation and special conditions of the supplier. [<TOP](#)

35. B Initial feasible solution of a transportation problem is developed by using the following three methods. [<TOP](#)

- North-west corner method
- Least cost method
- Vogel's approximation method

Vogel's approximation method is the most preferred method over the other two methods as it results in an optimal or near optimal solution.

36. D Adaptive forecasting: Adaptive forecasting is an advanced form of time series analysis, where the trend and seasonal components are adjusted after each demand observation. There are three widely used adaptive forecasting methods. [<TOP](#)  
They are:
- Simple moving average
  - Weighted moving average
  - Exponential smoothing
- Delphi and nominal group technique are qualitative methods.  
Deseasonalized trend method is static forecasting method.  
Linear regression is a causal quantitative model.
37. C Employees self timing technique is cost effective and simple to use. And **it does not take allowances into consideration while measuring work**. It also upsets the normal work routine, as recording and sorting data takes considerable time. [<TOP](#)  
The training requirement for conducting this technique is minimum.
38. A Statements (I) and (IV) are true regarding customized product design. [<TOP](#)  
Statements (II) and (III) are true regarding standardized product design.
39. C In work measurement the selected job should be standardized. The job should use standard tools and materials. Then only it is possible to estimate time standard. When the job is using different tools and materials different times will be observed [<TOP](#)
40. A Several models and techniques are available that help managers make appropriate location decisions. Some of the models are: [<TOP](#)
- Cost-Profit-Volume analysis
  - Point rating method
  - Transportation method
  - Center of gravity method
  - Analytic Delphi method
- Computer search models are used in aggregate planning and critical ratio method is used in scheduling.
41. D Accepting free gifts from suppliers is an unethical practice in buying. [<TOP](#)  
Organizations develop a set of rules and guidelines to ensure that their purchasing personnel conduct business in an ethical manner. Some of these rules are:
- Organizations interest should be kept in mind while purchasing
  - Selection of suppliers should be on merit
  - Purchasing activities should be conducted honestly and truthfully
  - All purchasing commitments should be complete on time
  - No undue favor should be taken from or given to suppliers.
42. A The least square method is used to generate a regression model by assigning data to a single line. [<TOP](#)
43. D Reasons for using simulation: [<TOP](#)  
II. Ability to analyze complex situations.  
III. Convenience of conducting experiments without disrupting the real system.  
Statement I is false as, formulation of simulation method is quite complicated and the costs associated with it are high.



44. D When the item is produced within the firm, there are costs associated with the set up of the production equipment for running the production. These may be ordering cost for equipment, transportation, installation etc. These costs fall under ordering cost and accounted in ordering costs. [<TOP](#)
45. D The following statements are true regarding graphical method of linear programming. [<TOP](#)
- Graphical method is applicable only for the problems in which a maximum of two decision variables are involved.
  - The inequality constraints are to be converted into equalities.
  - When the objective function is parallel to one of the sides of the feasible region, then **all the points** on the line result in the **same** values for the objective function.
46. D Capacity can be measured in terms of the inputs or outputs of the conversion process. Manufacturing organizations measure it in output, where as in service organizations measuring output is not possible, so the input rate is used to measure the capacity. For a company with single product or similar products in its portfolio, capacity is given as the number of units per month. For an organization with a multitude of products in its product portfolio, capacity is measured in a common unit such as sales in a monetary unit per a given operating period. Hence statement (I), (II) are true and (III) is false. [<TOP](#)
47. B The time consumed by an average worker, working at an average speed, to perform a task under normal operating conditions is known as **time standard**, **work standard** or simply **standard**. [<TOP](#)
48. A Job shop production system is more flexible among other systems. The system produces variety of products in small batches. Sometimes the batch consists of a single unit. [<TOP](#)
49. C Mean Absolute Deviation (MAD) is a simple method that measures the dispersion (or variation) of observed values around the expected values. MAD measures the forecasting accuracy, where as the other options are forecasting methods. [<TOP](#)
50. B According to the technical feasibility ‘the set of duties or tasks assigned to a worker should be designed to keep the workload at a convenient level, i.e. the workload for each worker should be within the reasonable limits of his skills, and physical and mental ability’. [<TOP](#)
51. C A transportation problem is said to be unbalanced if the total quantity of goods produced at all origins is not equal to the total requirement of all the warehouses. In such cases, a dummy origin or warehouse is to be added. [<TOP](#)
- A dummy origin is added when the production capacity is less than the requirement.
- A dummy warehouse is added when the production capacity is more than the requirement.

52. C Annual usage or Demand D = 10,000 units [<TOP](#)

Ordering cost per order ( $C_o$ ) = Rs.200

Carrying cost ( $C_h$ ) = Rs.25

$$EOQ = \sqrt{\frac{2C_o D}{C_h}} = \sqrt{\frac{2 \times 200 \times 10,000}{25}} = \sqrt{1,60,000} = 400 \text{ units}$$

Number of working days = 285

Lead time = 12 days.

$$\text{Demand per day} = \frac{\text{Total annual demand}}{\text{No. of working days}} = \frac{10,000}{285} = 35.08 = 35 \text{ units}$$

Reorder point = Demand per day  $\times$  Lead time = 35  $\times$  12 = 420 units.

53. E A good job design leads to minimizing the worker input. It helps in higher production with lower inputs. [<TOP](#)

54. D The process layout requires more floor space. Hence option (d) is not true. The remaining options are the advantages of process layout. [<TOP](#)

55. C Sum of task times T = 80+40+50+20+40+30+60+50+20+30+30+35 = 485 [<TOP](#)  
Cycle time C = 100

$$\text{Theoretical number of workstations } N_t = \frac{T}{C} = \frac{485}{100} = 4.85 = 5 \text{ workstations}$$

Station	Task	Time (in sec)	Unassigned Time (in sec)	Feasible Remaining Tasks
S1	A	80	20	D
	D	20	0	None
S2	C	50	50	B
	B	40	10	None
S3	E	40	60	F, I
	F	30	30	I
	I	20	10	None
S4	G	60	40	J
	J	30	10	None
S5	H	50	50	K
	K	30	20	None
S6	L	35	65	None

Actual number of workstations = 6.

56. C When prices are reduced, customer buys large volumes of products/services, till a point, after which the curve becomes almost horizontal. [<TOP](#)

57. E In a group technology layout, dissimilar machines are grouped into work centers to work on products similar in shape and processing requirements. [<TOP](#)

58. A The individual departments are flexible to alter its purchasing policy on the basis of specific requirements, belongs to decentralized purchasing system. [<TOP](#)  
All other options are true for centralized purchasing system.

59. C

[<TOP](#)

Demand Forecast ( $F_t$ )	Actual Demand ( $A_t$ )	Deviation ( $A_t - F_t$ )
340	328	-12
341	350	9
343	336	-7
373	386	13
352	340	-12
342	347	5
		Total = -4

$$\text{Mean Forecast Error} = \frac{1}{n} \sum_{t=1}^n (A_t - F_t) = \frac{-4}{6} = -0.67$$

60. B The row with minimum ratio is called the key row. [<TOP](#)

61. D Identifying what work must be performed, how it will be performed, where it is to be performed and who will perform it is known as Job design. [<TOP](#)

62. A In Computerized Relative Allocation of Facilities Technique (CRAFT) finds a layout by evaluating thousands of alternative layouts quickly. The initial layout, a matrix identifying the number of loads moved among process centers, and a matrix of the cost of transporting loads among process centers have to be provided to CRAFT. CRAFT then evaluates the effectiveness of the initial layout and exchanges the locations of pairs of process centers. Each exchange is evaluated for its effectiveness and the best exchange is adopted. The process is repeated several times until there is no further reduction in the material-handling costs. Finally, the last available solution is considered as the final layout. [<TOP](#)

63. E Work sampling is a technique of analyzing work by taking several observations, usually, at random, to see the relative frequency with which various elemental activities take place. [<TOP](#)

64. A The components of job description are: [<TOP](#)

- Job title
  - Job identification
  - Job duties
  - Job specification

Job analysis is not a component of job description. It is investigation of job content, the physical conditions in which the job is done and the qualifications that are necessary to carry out job responsibilities.

65. B The following statements are true regarding the assumptions of EOQ model. [<TOP](#)

- The quantity of inventory ordered is delivered in a single lot.
- Materials are issued in **equal** quantities to the indenting departments.
- The lead time for material delivery is known with certainty and remains constant.

66. D Following are responsibilities of the purchase manager: [<TOP](#)

- Selection of suppliers
- Vendor development
- Value analysis
- Contract negotiation and communication interface.

Design of production system is carried out by production department in coordination of senior management.

67. E Additivity assumes that the total value of the objective function and each constraint is equal to the sum of the individual contributions from each decision variable. It means that the model does not consider any synergistic or anti-synergistic effects among the decision variables while calculating the total value for the objective function. [<TOP](#)
68. D Options (a), (b), (c) and (e) are the reasons to maintain raw-material inventory, whereas option (d) is the reason to maintain semi-finished and finished goods inventory. [<TOP](#)
69. A Selection of a facility location is a strategic decision for any organization. [<TOP](#)
70. D 
$$\text{Standard time} = \frac{\text{Normal time}}{\text{Available fraction}}$$

$$\text{Normal time} = \text{Standard time} \times \text{Available fraction time}$$

$$= 1.75 \times 0.75 = 1.31 \text{ min}$$
 [<TOP](#)
71. A According to Fixed order Quantity system (Q system), inventory is continuously checked and a new order is placed when the level of inventory reaches a point, called re-order point. [<TOP](#)
72. E Aggregate planning defines the best combination of workforce level, inventory on hand, and production rate that matches the company's resources to market demand. [<TOP](#)
73. D Statements (I), (II) and (IV) are true regarding work measurement. Statement (III), use of statistical tables in work measurement is not true. [<TOP](#)
74. A Linear regression equation is  $Y = a + bX$   
a – represents the Y intercept of the line.  
b – represents the slope of the trend line. [<TOP](#)
75. D The following statements are true regarding graphical method for aggregate output planning. [<TOP](#)
- Horizontal axis shows the number of **cumulative productive days** for the planning period.
  - Vertical axis represents the cumulative units of output.
  - The graph is used to identify the periods of excess inventory and shortages.
76. A In time study the timing role of analyst is to record time for several cycles of the tasks and judge and record pace. [<TOP](#)

77. C Developing load reports from the planned order releases belongs to the sequential steps in the MPS process. [<TOP](#)  
 The Master Production Schedule specifies the type and volume of each product that is to be produced over the planning horizon. It is used to schedule the various stages of production, depending on the type of operation.  
 Master Production Scheduling is generally based on the results of demand forecasts. These results are not always accurate and the actual production output is not always the same as the actual market demand. To accommodate these imbalances, operations managers modify the Master Production Schedule using the following tactics:
1. By modifying the size or composition of the product or service temporarily.
  2. By allowing the levels of inventory to increase when the demand for the product is low and to decrease when the demand is higher.
  3. By deferring routine maintenance and allotting the saved labour for manufacturing purposes.
  4. By sharing the responsibilities with a subcontractor.
  5. By altering the prices of products to influence the demand level.
78. A VED classification is based on the importance of a particular item in the production process. [<TOP](#)
79. C An organization that wants to succeed in a competitive business environment needs a sound strategy. A strategy is a broad long term plan, conceived in order to achieve business objectives. [<TOP](#)
80. A The closed path for (F1,W1) : (F1,W1) – (F1,W3) + (F3,W3) – (F3,W1)  
 Net cost change = 13 – 10 + 12 – 11 = 25 – 21 = 4. [<TOP](#)
81. B During world war-II, many countries faced complex problems in logistics control and weapon system design and manufacture. During this period, the research teams formed by United States and other European nations, developed mathematical techniques to assist in taking appropriate decisions over complex logistical situations. These are known as operations research techniques, and the subject became popular as operations research. [<TOP](#)
82. C 
$$\text{Efficiency} = \frac{T}{N_a \times C}$$
 Where T= Sum of tasks  
 $N_a$  = Actual number of workstations  
 C = Cycle time  
 $T = 45 + 34 + 23 + 28 + 22 + 31 = 183$   
 $N_a = 8$   
 $C = 30$   

$$\text{Efficiency} = \frac{183}{8 \times 30} = 0.7625 = 0.76 = 76\% \text{ (Rounded up)}$$
 [<TOP](#)

83. E Sales price = Rs.450 per unit [<TOP](#)  
Material cost = Rs.90 per unit  
Labor cost = Rs.40 per unit  
Overheads = Rs.130 per unit  
Expected annual demand = 700 units  
variable cost = Material cost + Labor cost + Overheads  
= Rs.90 + Rs.40 + Rs.130 = Rs.260 per unit  
Total annual variable cost = Annual demand × variable cost per unit  
= 700 × 260 = Rs.1,82,000  
Fixed cost = Rs.80,000  
Total annual cost = Fixed cost + Variable cost  
= 80,000 + 1,82,000 = 2,62,000  
Expected annual sales = demand × sales price  
= 700 × 450 = 3,15,000  
Profit = Sales - Cost = 3,15,000 - 2,62,000 = 53,000
84. D The normal time estimated is not always equal to the standard time required to perform a task, as a person cannot perform consistently over a period of time for a variety of reasons. So, when calculating the standard time, allowances such as contingency allowance, interference allowance, relaxation allowance, etc. are considered. The fraction of time that elapses during the delays is considered as allowances. [<TOP](#)
85. C Opening stock for May = 490 units [<TOP](#)  
Productivity = 25 units per day  
Number of workers = 15  
Inventory holding cost = Rs. 3.
- | Particulars              | MAY  | JUNE |
|--------------------------|------|------|
| Opening stock            | 490  | 415  |
| Working days             | 23   | 24   |
| Actual production        | 8625 | 9000 |
| Demand forecast          | 8700 | 9200 |
| Shortage in supply       | 0    | 0    |
| Shortage cost            | 0    | 0    |
| Safety stock             | 0    | 0    |
| Closing inventory        | 415  | 215  |
| Inventory carrying costs | 1245 | 645  |
86. B (a), (c), (d) and (e) are correct [<TOP](#)  
(b) When a firm designs a structure internal to the firm that satisfies its production and service requirements, this internal structure is called as “Layout”  
Layout is designed only after the facility location is determined. Hence this statement is inapplicable here.
87. E Job specification describes the skills and qualifications required to perform the job competently. [<TOP](#)
88. B Produce-to-stock policy is useful for: [<TOP](#)  
I. Seasonal demand products.  
IV. General application products.  
Produce-to-order policy is useful for:  
II. Products meant exclusively for specific purposes.  
III. Products, parts or components of high value.

89. B Purchase department deals with various types of documents. A purchase requisition consist of a clear specification of required materials, quantity required, probable date of requirement, name of the department to which the costs are to be accounted and is approved by an authorized person to undertake the purchase. [<TOP](#)  
[≥](#)
90. B In growth stage, sales volume increases exponentially. During this stage, organizations take decisions regarding production capacity expansion. [<TOP](#)  
[≥](#)
91. D Designing the production system is one of the key responsibilities of any operations manager. It involves selecting the product design, the production system, and the inventory policy of finished goods for each product line. [<TOP](#)  
[≥](#)
92. A Let variable  $X_1$  indicate a mixture of ingredient A(in tons) [<TOP](#)  
[≥](#)
- Let variable  $X_2$  indicate a mixture of ingredient B(in tons)
- The fertilizer company needs to produce minimum of 240 tons of a mixture consisting of ingredients A and B.
- $$X_1 + X_2 \geq 240.$$
- The ingredients A costs Rs.4 per ton and B costs Rs.6 per ton. Therefore the total cost will be  $4X_1 + 6X_2$ . Hence the objective function is minimize  $Z = 4X_1 + 6X_2$ .
- A can be used not more than 80 tones  $\Rightarrow X_1 \leq 80$ .
- B must be used at least 50 tones  $\Rightarrow X_2 \geq 50$ .
- To minimize the cost mixture.
- The formulation of given linear programming problem is
- Minimize(costs)  $Z = 4X_1 + 6X_2$
- Subject to the constraints
- $$X_1 + X_2 \geq 240.$$
- $$X_1 \leq 80$$
- $$X_2 \geq 50.$$
- $$X_1 \geq 0, X_2 \geq 0.$$
93. B Computer Aided Manufacturing (CAM) is a specialized computer system, which translates CAD design information into instruction for numerically controlled automated machines. [<TOP](#)  
[≥](#)

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