

# Question Paper

## Operations Management - II (MB2E4): January 2009

- Answer all 85 questions.
- Marks are indicated against each question.

**Total Marks : 100**

1. Productivity is a measure of the efficiency of an organization. Which of the following statements is/are **true** with respect to productivity? [<Answer>](#)
- I. Measuring productivity in service organizations is easy.
  - II. Poor layout design is a reason for bottleneck in the production process hampering productivity.
  - III. Inputs and outputs in measuring productivity can be either tangible or intangible.
- (a) Only (I) 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)**
2. Which of the following statements represent the precedence notation for representing a project in a network? [<Answer>](#)
- I. Activities are represented by circles with arrows linking them together to show the order of their performance.
  - II. Activities are represented by arrows.
  - III. Events are used to connect predecessor and successor activities.
  - IV. The activities are identified with a number or name, and dummy activities are generally not used.
- (a) Both (I) and (III) above  
(b) Both (I) and (IV) above  
(c) Both (II) and (IV) above  
(d) (I), (II) and (III) above  
(e) (II), (III) and (IV) above. **(1 mark)**
3. Arch Manufacturing Ltd. uses various types of robots for its operations. Which of the following category of robots perform a set of operations according to the instructions given in the program, based on data fed into them through devices like punched tapes, data cards and digital switches? [<Answer>](#)
- (a) Physically operated robots  
(b) Fixed sequence robots  
(c) Numerical control robots  
(d) Playback robots  
(e) Intelligent robots. **(1 mark)**
4. Enterprise Resource Planning (ERP) implementation is a long process with various stages that involves considerable investment in the form of time and money. Which of the following stages emphasizes on reducing the process cycle time and optimizing the information flow between different functions and departments? [<Answer>](#)
- (a) Identifying the business needs for the ERP package  
(b) Evaluating the “as-is” situation of the business  
(c) Decisions about the desired “would-be” situation for the business  
(d) Reengineering of business processes to achieve the desired results  
(e) Evaluation of available ERP packages. **(1 mark)**

5. Efficient use of the firm's resources to provide best service to the customers is the main objective of scheduling the operations within a firm. Which of the following statements is/are **false** regarding scheduling? [<Answer>](#)
- I. Scheduling too much capacity results in the facilities remaining idle.
  - II. Scheduling is a long-range planning activity.
  - III. Forward scheduling is used in operations that require high customization.
  - IV. Backward scheduling is used by wholesalers to replenish the stock.
- (a) Only (I) above
  - (b) Both (I) and (II) above
  - (c) Both (II) and (III) above
  - (d) Both (II) and (IV) above
  - (e) Both (III) and (IV) above.
- (1 mark)** [<Answer>](#)
6. Automation, defined as technology that performs a task or set of tasks based on programmed commands, has several advantages in spite of the high costs involved. Which of the following benefits of automation leads to reduction in the average number of working hours per week for the worker? [<Answer>](#)
- (a) Improvement in productivity
  - (b) Requirement of technical manpower
  - (c) Improvement in the work environment for workers
  - (d) Improvement in the quality of the product
  - (e) Reduced factory lead-time.
- (1 mark)** [<Answer>](#)
7. Which of the following are the elements considered to ensure the involvement of people in organizations for the successful implementation of Just-In-Time (JIT)? [<Answer>](#)
- I. A spirit of teamwork.
  - II. A work culture driven by discipline.
  - III. Involvement of the suppliers to ensure supply of materials and components in the required quantities.
  - IV. A work culture that encourages setting up a separate department with specialists for correcting the defects of any worker.
- (a) Both (I) and (II) above
  - (b) Both (II) and (III) above
  - (c) Both (II) and (IV) above
  - (d) (I), (II) and (III) above
  - (e) (II), (III) and (IV) above.
- (1 mark)** [<Answer>](#)
8. As many countries are globalizing their operations, the role of WTO has gained prominence. Which of the following statements is **false** with respect to the role of WTO? [<Answer>](#)
- (a) WTO establishes the principles of trade between nations after consulting all the member countries
  - (b) If a country reduces its duties, these rules will be equally applicable to all nations of the world regardless of their membership in WTO
  - (c) WTO ensures that the rules and regulations are not repealed or modified suddenly
  - (d) WTO provides a forum for discussion where member countries can come together to discuss trade related issues and concerns
  - (e) It acts as a dispute settlement body for trade related disputes among member countries.
- (1 mark)** [<Answer>](#)
9. Supply Chain Management (SCM) has become one of the key areas that organizations are focusing on to reduce costs and improve the efficiency of the production process. Which of the following statements correctly represent the drivers of SCM? [<Answer>](#)
- I. The objective of the supply chain management should be to reduce the inventory cost without compromising the responsiveness of the organization.
  - II. Selecting the mode of transportation, route and network are the key components in transportation decisions.
  - III. It is ideal for organizations to have more facilities catering to different markets.
  - IV. The flow of information in an organization also affects the performance of other drivers.
- (a) Both (I) and (II) above
  - (b) Both (I) and (III) above
  - (c) Both (II) and (IV) above
  - (d) (I), (II) and (III) above
  - (e) (I), (II) and (IV) above.
- (1 mark)**

10. Facilities management department that focuses on the activities related to managing the organization's facilities involves a range of activities. Which of the following activities is based on the equipment specification, the type of furniture etc.?

[<Answer>](#)

- (a) Space planning and forecasting
- (b) Facilities planning and forecasting
- (c) Workplace planning, allocation and management
- (d) Alteration, renovation and workplace installation
- (e) Engineering planning and design.

(1 mark)

[<Answer>](#)

11. Which of the following statements is **false** regarding network modeling?

- (a) Managers must be trained to understand and use the time estimates and activity variance in network scheduling effectively
- (b) Organizations adopting projects with a predetermined completion time are forced to work forward to complete a project on time
- (c) Events represent the completion of some activities and the beginning of some new activities in the network
- (d) Network-based scheduling techniques provide a means for estimating the time and cost impact of changes in the project at the planning stage
- (e) It simplifies the process of identifying and scheduling activities.

(1 mark)

[<Answer>](#)

12. The machine tools division of HMT Ltd. has two job orders, N to produce 600 nuts of 2mm and B to produce equal number (600) of bolts. Both these orders have to be processed on two machines M1 and M2. The route sheets for the jobs, which should be ready in the next 9 hours with both the machines starting processing from now, are given below.

Job N Route sheet			Job B Route sheet		
Routing sequence	Machine	Processing time (Hours)	Routing sequence	Machine	Processing time (Hours)
1	M1	3	1	M2	1
2	M2	1	2	M1	2
3	M1	2	3	M2	2
<b>Total</b>		<b>6</b>	<b>Total</b>		<b>5</b>

Identify the time till which the jobs can be delayed in starting to finish them by the end of 9 hours.

- (a) 2<sup>nd</sup> hour for Job N, 5<sup>th</sup> hour for Job B
- (b) 2<sup>nd</sup> hour for both Job N and Job B
- (c) 7<sup>th</sup> hour for Job N, 5<sup>th</sup> hour for Job B
- (d) 3<sup>rd</sup> hour for Job N, 5<sup>th</sup> hour for Job B
- (e) 7<sup>th</sup> hour for Job N, 4<sup>th</sup> hour for Job B.

(2marks)

[<Answer>](#)

13. Kanban system uses three types of cards to initiate material transactions. Which of the following details are included in a conveyance authorization card?

- I. Product name.
  - II. Identification number.
  - III. Quantity ordered.
  - IV. Delivery destination.
- (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) (I), (II) and (IV) above.

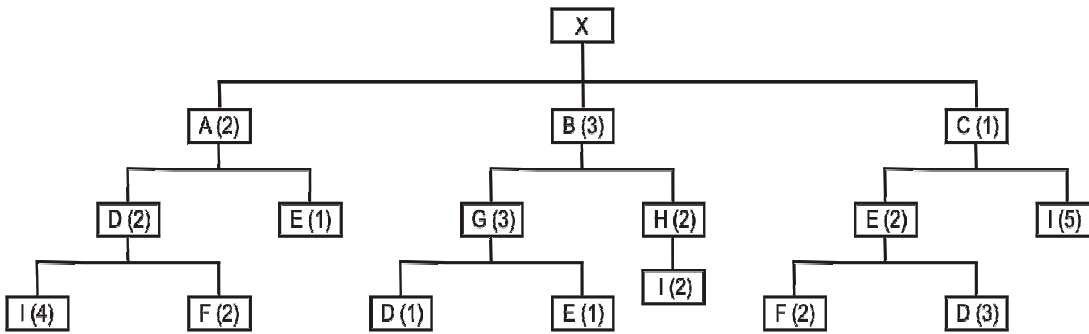
(1 mark)

14. ERP packages provide one-stop solutions to all business process requirements. Which of the following is/are **not** constraint(s) in the process of integrating different business entities by ERP? [<Answer>](#)
- I. Geographical differences.
  - II. Managerial differences.
  - III. Functional differences.
- (a) Only (I) above
  - (b) Only (II) above
  - (c) Both (I) and (II) above
  - (d) Both (I) and (III) above
  - (e) All (I), (II) and (III) above. (1 mark)
15. Manufacturing line workers and staff supervisors carry out operations control functions involving various activities. Which of the following is **not** one of those activities? [<Answer>](#)
- (a) Purchasing parts and components
  - (b) Executing work orders
  - (c) Monitoring material movements
  - (d) Developing the production plan
  - (e) Checking worker performance. (1 mark)
16. Which of the following is/are the approach(es) used for quality control? [<Answer>](#)
- I. Preventive control approach.
  - II. Concurrent control approach.
  - III. Feedback control approach.
  - IV. Remedial control approach.
- (a) Only (II) above
  - (b) Only (IV) above
  - (c) Both (I) and (II) above
  - (d) (I), (II) and (III) above
  - (e) All (I), (II), (III) and (IV) above. (1 mark)
17. Which of the following automation tools incorporates computer graphics and computer-aided engineering systems? [<Answer>](#)
- (a) Computer Aided Design
  - (b) Artificial Intelligence
  - (c) Indirect Computer Aided Manufacturing
  - (d) Computer Integrated Manufacturing
  - (e) Flexible Manufacturing System. (1 mark)
18. Which of the following departments is benefited in the form of increased focus on activities like vendor selection, sourcing and managing relationships with vendors/suppliers through instant access to information to the suppliers? [<Answer>](#)
- (a) Purchase department
  - (b) Raw material inventory department
  - (c) Production department
  - (d) Shipping department
  - (e) Finished goods inventory department. (1 mark)
19. Which of the following statements are **true** regarding the dispatching rules followed by organizations in scheduling their production activities? [<Answer>](#)
- I. The dispatching rules followed by manufacturing and service organizations are same.
  - II. Organizations give highest priority to jobs with the longest processing time to keep a lower number of jobs in waiting.
  - III. Organizations adopting the first in, first serve rule treat all the jobs as equally important.
  - IV. In the slack time remaining rule, the slack time of the jobs is assessed as the difference between the time remaining in the due date and the processing time required.
- (a) Both (I) and (II) above
  - (b) Both (I) and (III) above
  - (c) Both (II) and (IV) above
  - (d) (I), (III) and (IV) above
  - (e) All (I), (II), (III) and (IV) above. (1 mark)

20. Which of the following elements for building effective partnerships requires the JIT firms to allow the suppliers to purchase new machinery, add more machinery and equipment, hire and train labor etc., in line with its requirements? [<Answer>](#)
- (a) Trust
  - (b) Marketing strategies
  - (c) Linearity of production
  - (d) Communication
  - (e) Time to make changes.
- (1 mark)**
21. Facilities managers use out-tasking/outsourcing to carry out the various tasks in facilities management. Out-tasking refers to [<Answer>](#)
- I. Hiring of individual, specialized vendors.
  - II. Integrating the expertise and capacity of a service provider toward a strategic objective.
  - III. Supplementing in-house delivery capability with sub-contracted expertise.
- (a) Only (I) 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)**
22. Materials management is defined as the grouping of management functions supporting the complete cycle of material flow from the purchase of raw materials to the shipping and distribution of finished goods. Which of the following statements is/are **false** regarding materials management? [<Answer>](#)
- I. Materials management means stocking large amounts of materials to avoid the problem of a shortfall of material.
  - II. The flow process of a service firm is similar to the flow process of a typical manufacturing firm.
  - III. Quality of the end product is independent of the materials management in a firm.
  - IV. A change in the expenditure on materials does not impact the return on investment of a firm.
- (a) Only (II) above
  - (b) Both (I) and (III) above
  - (c) Both (II) and (III) above
  - (d) (I), (III) and (IV) above
  - (e) (II), (III) and (IV) above.
- (1 mark)**
23. Which of the following is identified as the precursor to ERP implementation that represents diagrammatically different business systems and processes, and their interconnections and interdependencies for providing a general overview of the operations of a business without going into the technical details of the processes and systems? [<Answer>](#)
- (a) Business process reengineering
  - (b) Business modeling
  - (c) Enterprise resource planning
  - (d) Precedence diagram
  - (e) Bills of material.
- (1 mark)**

[<Answer>](#)

24. The Bills of Material for Product X with an on-hand inventory of 125 units of subassembly A and 112 units of subassembly B at the time of starting the production process is given below. If 450 units of X are required, calculate the number of units of D required.



- (a) 7,964 units
- (b) 6,856 units
- (c) 6,244 units
- (d) 5,432 units
- (e) 5,024 units.

(2marks)

[<Answer>](#)

25. Scheduling the service operations of an organization is based on the demand requirements rather than the inventory requirements. Which of the following statements is **true** regarding the type of operations considered by operations managers?

- (a) Job operations involve the production of products or services in high volumes
- (b) JIT principles, queuing analysis, Gantt charts and critical ratio methods are used to schedule the repetitive operations
- (c) Job operations' scheduling focuses on synchronizing the customer demand with the production activities of the firm
- (d) An option wherein the employees can choose their start time, working for eight hours each day is given in flextour, one of the personnel-related scheduling approaches
- (e) Part-time work results in firms spending more in the form of personnel costs.

(1 mark)

[<Answer>](#)

26. Which of the following statements are **true** regarding the sources of competitive advantage for organizations competing in a global environment?

- I. Organizations can achieve a cost advantage by decentralizing their production and catering to different customer base.
- II. Economies of scale in marketing are generally evident in aircraft manufacturing due to their strategy of using the same promotion strategy in different markets.
- III. The ability to take advantage of economies of scale is influenced by the needs of the local requirements.
- IV. For organizations operating in the microprocessor and semiconductor industries, proprietary product technology is the major factor deriving benefits.

- (a) Both (I) and (II) 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)

27. Which of the following statements relating to the principles of SCM is/are **true**? [<Answer>](#)

- I. Customers should be segmented based on trade channel.
- II. Companies designing their logistics system to meet the average requirements of all the customers leads to poor resource utilization.
- III. Modern manufacturers recognize the potential of traditional strategies like mass customization, unlike the traditional manufacturers.
- IV. In the long term, IT should help in planning and decision making, and effective resource allocation through a master production schedule.

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

**(1 mark)**

28. Which of the following is used by operations managers for activities such as capacity planning, purchasing, inventory control, quality reporting etc.? [<Answer>](#)

- (a) Flexible Manufacturing System
- (b) Direct Computer Aided Manufacturing
- (c) Indirect Computer Aided Manufacturing
- (d) Computer Numeric Controlled machines
- (e) Computer Aided Design.

**(1 mark)**

29. Which of the following is one of the quality functions that a company can compete on, where the customers rely heavily on the reputation of the organization and the past performance of its products when attaching a value to its new products? [<Answer>](#)

- (a) Performance
- (b) Aesthetics
- (c) Perceived quality
- (d) Reparability
- (e) Features.

**(1 mark)**

30. Consider the following network (duration in weeks): [<Answer>](#)

The completion time of this project is

- (a) 56 weeks
- (b) 62 weeks
- (c) 70 weeks
- (d) 78 weeks
- (e) 83 weeks.

**(3marks)**

31. Which of the following statements relating to the characteristics of JIT firms is/are **true**? [<Answer>](#)
- I. Arranging facilities in L-shape makes it easy for firms to identify the defects at any stage of the production process.
  - II. The work center that observed any defect, stops operations without hampering the operations of the work centers downstream.
  - III. Keeping the materials in functional departments ensures minimum movement resulting in reduced material-handling costs.
  - IV. Cross-training of the workforce makes the production process more flexible.
- (a) Only (II) above
  - (b) Only (IV) above
  - (c) Both (I) and (III) above
  - (d) (I), (II) and (III) above
  - (e) (I), (III) and (IV) above.
- (1 mark)** [<Answer>](#)
32. The process of materials management involves the flow of materials through the entire firm, starting from the selection of a supplier to the point of receipt by the customers. Which of the following statements is **true** regarding the functions of materials management? [<Answer>](#)
- (a) The finished goods inventory department is involved in the production control function to carry out the task of checking the quantity and quality of the products in the production process
  - (b) The tasks of the receiving department include selecting the vendors to obtain the materials required, unpacking and checking the quantity and quality of incoming materials, and generating the receiving reports
  - (c) The materials receiving report is used by the purchase department to update its material database and to evaluate vendors
  - (d) Computing the storing capacity required in the department and adjusting it to maintain a smooth flow of work is the task performed by the raw materials inventory department
  - (e) The overlapping of the purchasing and raw materials inventory departments can cause conflicts in the execution of the two functions of production control and inventory control.
- (1 mark)** [<Answer>](#)
33. Which of the following statements is **false** regarding the issues to be considered for the success of ERP? [<Answer>](#)
- (a) The functionality of an ERP package should complement the prevailing best business practices in the company's field of operation
  - (b) If the package requires customization to support the business practices of the organization, it results in delays and budget shortfalls
  - (c) The package selected should not support the non-proprietary technology standards
  - (d) The ERP package should be easy to configure and use, and flexible enough to accommodate the optimization of business processes
  - (e) The technology used in the ERP packages should be adaptable to any future changes in business processes without excessively large investment in upgradation.
- (1 mark)** [<Answer>](#)
34. Materials Requirement Planning (MRP) is a comprehensive system used for planning and scheduling materials requirement. Which of the following is **not** an advantage of the MRP system? [<Answer>](#)
- (a) It ensures low inventory levels
  - (b) It provides a better estimate of the lead-time
  - (c) It enables comprehensive material tracking
  - (d) It helps in reducing the tear-down costs
  - (e) It facilitates better customer service.
- (1 mark)**



35. The probabilities of failure after maintenance for a machine used in the manufacture of solar water heaters for GSWH Pvt. Ltd., are given in the following table:

Quarters after maintenance	1	2	3	4
Probabilities of break-down	0.1	0.2	0.3	0.4

If there are 12 identical machines in the plant, the average cost of preventive maintenance per machine is Rs.1,385 and the cost of remedial maintenance per machine is Rs.8,765, calculate the average total cost of maintenance per month.

- (a) Rs.7,998
- (b) Rs.11,523
- (c) Rs.16,284
- (d) Rs.22,469
- (e) Rs.24,248.

(3marks)

36. Service firms use various methods to meet the customer demand. Which of the following is/are **true** regarding service operations and the methods used to meet the customer demand under situations of limited availability of service facilities?

- I. Reservation systems are used to schedule multiple resources required together to meet the demands of several customers.
- II. Hospitals engaged in rendering service facilities meet peak demand by engaging part-time workers.
- III. Appointment systems are useful in non-emergency situations.
- IV. Strategic product pricing is a scheduling approach that helps firms adjust to shifts in demand.

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

(1 mark)

37. Which of the following is a reason for institutional impediments faced by organizations intending to operate globally?

- (a) Logistical problems
- (b) Income levels of consumers
- (c) Climatic conditions of the market
- (d) Governmental pressure to engage in local R&D
- (e) Varying preferences and tastes.

(1 mark)

38. Which of the following statements relating to the forces shaping supply chain management is **false**?

- (a) Organizations are going global to take advantage of the untapped foreign market
- (b) In the current competitive environment, modern organizations consider market share as a good measure of profitability
- (c) Consumer demand focuses on finding a balance between cost and quality, and customization and availability without compromising on any one of them
- (d) Information explosion is facilitating the expansion of supply chain activities to different parts of the world
- (e) An organization's supply chain decisions have to take into account the regulations and policies of other countries as well.

(1 mark)

39. Which of the following is **not** one of the FMS layouts of the system that offers advantages such as reduced direct labor, shorter response time, consistent quality of products etc.?

- (a) Progressive layout
- (b) Closed loop layout
- (c) Hybrid layout
- (d) Ladder layout
- (e) Open field layout.

(1 mark)

40. Productivity is influenced by its components independently in different ways. Which of the following leads to allocative efficiency? [<Answer>](#)
- (a) Adoption of an optimal mix of factors of production
  - (b) Cost reductions without a compromise on the quality of the material purchased
  - (c) Increasing the output with the same number of inputs
  - (d) Producing the same output using fewer inputs
  - (e) Fixed ordering cost for a raw material irrespective of the quantity ordered. (1 mark)
41. An infrastructure firm dealing in the construction of roads and bridges uses various materials handling equipment. Which of the following can be classified as fixed path equipment? [<Answer>](#)
- (a) Trucks
  - (b) Forklifts
  - (c) Mobile cranes
  - (d) Conveyors
  - (e) Tractors. (1 mark)
42. Parity Group is a provider of ERP packages to diverse industries. Focusing on which of the following will enable the group to reduce the customization efforts required? [<Answer>](#)
- (a) Global presence
  - (b) Modularity
  - (c) Investment in R&D
  - (d) Target market
  - (e) Price. (1 mark)
43. Mach Engineering Works has appointed a new manager for supervising the operations of the firm after installing MRP system. The management wants him to assess the reports generated by the MRP system. Which of the following are the primary reports generated by the MRP system to be assessed by him? [<Answer>](#)
- I. Planned orders.
  - II. Planning reports.
  - III. Order releases.
  - IV. Changes in due date.
- (a) Both (I) and (II) above
  - (b) Both (II) and (III) above
  - (c) Both (II) and (IV) above
  - (d) (I), (III) and (IV) above
  - (e) (II), (III) and (IV) above. (1 mark)
44. A firm with a net turnover of Rs.75 lakh as result of incurring high holding costs is contemplating a proposal to implement JIT system in its organization from the next financial year. Which of the following is **not** a benefit it could derive by using JIT? [<Answer>](#)
- (a) Reduced investment in inventory
  - (b) Zero inventory storage and maintenance costs
  - (c) Higher involvement of employees
  - (d) Reduced utilization of machinery and equipment
  - (e) Reduced formal paperwork. (1 mark)
45. Which of the following focuses on the organizations' need to have a proper control mechanism to ensure the success of facilities in foreign markets, and maintaining a balance between authority, responsibility and accountability for smooth operations? [<Answer>](#)
- (a) Facilities
  - (b) Management and organization
  - (c) Integration
  - (d) Procedures and planning
  - (e) Workforce. (1 mark)

46. Maintenance management ensures the optimum efficiency of the systems that are working. Which of the following statements relating to maintenance planning is **true** that assists in decisions regarding the maintenance requirements?

[<Answer>](#)

- (a) During the first stage of infant mortality, the probability of failure is low but increases gradually
- (b) If organizations are unable to fulfill the maintenance activities, they adopt contract maintenance which assures the involvement of the in-house maintenance department
- (c) The failure rate is constant in the adult stage
- (d) During the adult stage, organizations go in for a replacement of the system
- (e) Causes for failure during the adult stage can be attributed to improper design and installation.

(1 mark)

47. Following is the information related to 5 job orders – S1, S2, S3, S4 and S5 to prepare screws of varying sizes, for 2 different machines received by the division of a manufacturing organization dealing in spare parts.

[<Answer>](#)

Job (In order of arrival)	Processing Times (Days)	Due date (Days hence)
S1	4	6
S2	6	8
S3	5	7
S4	5	9
S5	3	4

Calculate the average delay of a job using the dispatching rule earliest due date.

- (a) 3.25 days
- (b) 4.75 days
- (c) 5.75 days
- (d) 6.00 days
- (e) 6.25 days.

(2marks)

48. In which of the following SCM components are certification processes listed?

[<Answer>](#)

- (a) SCM strategy
- (b) Operational planning
- (c) Business relationship management
- (d) Order-to-delivery process
- (e) Quality and performance management.

(1 mark)

49. Which of the following come under the purview of the cost of failure?

[<Answer>](#)

- I. Cost of equipment maintenance.
- II. Investments made in education/training programs.
- III. Field survey costs.
- IV. Downtime costs.

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

(1 mark)

50. The duration of a project involving the installation of new machinery in a manufacturing firm is 56 days. The activities 1 – 2, 2 – 3, 4 – 5 and 6 – 7 are crashed by 3, 5, 6 and 4 days respectively. If the cost of crashing per day is 25, 33, 46 and 29 rupees respectively, calculate the additional cost of the project for reducing the project duration.

[<Answer>](#)

- (a) Rs.596
- (b) Rs.632
- (c) Rs.659
- (d) Rs.694
- (e) Rs.753.

(2marks)

51. Robots are versatile, computer-controlled machines programmed to perform various tasks independently. The robots whose sequence of actions are usually triggered by electronic sensors are [<Answer>](#)

- (a) Physically operated robots
- (b) Fixed sequence robots
- (c) Variable-sequence robots
- (d) Playback robots
- (e) Intelligent robots.

(1 mark)

52. Which of the following steps in the implementation of an ERP package involves verifying the performance of the system after customization and master data transfer? [<Answer>](#)

- (a) Test runs
- (b) Gap analysis
- (c) Parallel runs
- (d) System monitoring and fine-tuning
- (e) Mapping of business processes onto the package.

(1 mark)

53. Operations managers convert all the requisite information into a form acceptable to the MRP system using three common elements. Which of the following statements is **false** regarding the elements of MRP? [<Answer>](#)

- (a) Master Production Schedule (MPS) is an input of MRP containing information about cumulative lead-time available for purchasing, receiving, fabricating and assembling
- (b) Inventory records file contains information about the spare parts supplied to the customers
- (c) Planned order releases are determined using the information obtained from netting and offsetting processes
- (d) Primary reports are generated in the MRP to assess the inventory required in a specific time bucket
- (e) The time horizon in the MPS is divided into time buckets.

(1 mark)

54. Which of the following statements relating to the expert systems are **true**? [<Answer>](#)

- I. It consists of a program that enables the system to evaluate the rules in the knowledge base.
- II. A single inference engine can be used to drive different knowledge bases.
- III. The systems are provided with a language interface.
- IV. Numerical control method is used in this system.

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

(1 mark)

55. Ascent Management Institute consisting of 4 faculty A, B, C and D, is contemplating to draw up a weekly schedule for each faculty with two consecutive days off in a week. The number of faculty required on each day of the week are: [<Answer>](#)

Monday	4
Tuesday	3
Wednesday	4
Thursday	3
Friday	2
Saturday	5
Sunday	3

The two consecutive days of the week when Faculty A would get an off are

- (a) Monday and Tuesday
- (b) Tuesday and Wednesday
- (c) Wednesday and Thursday
- (d) Thursday and Friday
- (e) Friday and Saturday.

(1 mark)

56. Which of the following characteristics of a JIT system reduces the cycle inventory, cuts lead times and also helps in reducing the waiting time in the production processes?

[<Answer>](#)

- (a) Uniform workstation loads
- (b) Small lot sizes
- (c) Remedial maintenance
- (d) Flexible facilities and multi-skilled workforce
- (e) Continuous improvement.

(1 mark)

57. Outsourcing of facilities management to external agencies originates from the facilities management department. Which of the following statements relating to outsourcing is **false**?

[<Answer>](#)

- (a) It results in a decrease in the staffing quality
- (b) If the client organization passes over control of its facilities to an external agency, the client still has full power to control any deviations in the performance of the vendors
- (c) It ensures more focus on core competencies
- (d) It is not always profitable as it increases the costs of the client and eventually decreases the quality of work
- (e) It results in decrease in flexibility to the client organizations due to long term contracts.

(1 mark)

58. The workforce of Automeris Assembling Works Pvt. Ltd. is performing the fabrication work. The following information relates to the number of defects noted in the fabrication process after observing a sample of 12 items.

[<Answer>](#)

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12
Number of Defects	5	11	6	10	6	2	5	9	7	3	8	1

Assuming that the average number of defects from the process is 62.5% more than the current average, find the revised average number of defects from the process, and the upper and lower control limits respectively.

- (a) 6.70, 14.46, 0
- (b) 6.70, 14.46, 1.06
- (c) 9.88, 19.30, 0.46
- (d) 9.88, 18.95, 0.93
- (e) 9.64, 18.95, 0.33.

(2marks)

59. Which of the following SCM enablers is not restricted to self-contained processes like the purchase order process, but is undertaken for complete SCM processes like the order-to-delivery process?

[<Answer>](#)

- (a) Alignment
- (b) Measurement
- (c) Participation
- (d) Periodic review
- (e) Design.

(1 mark)

60. Which of the following statements represent the critical path method?

[<Answer>](#)

- I. It is used in identifying the precedence relationship among various tasks of a project.
- II. Forward pass is used to find the float for an activity.
- III. Variances of the activities are calculated in this method.
- IV. Backward pass begins from the end node, and proceeds towards the first node.

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

(1 mark)

61. Which of the following are **not true** relating to the features of JIT purchasing? [<Answer>](#)
- I. This system facilitates achieving a stage of zero defects by both buyers and sellers.
  - II. In this system, the high value components arrive prior to the requirement as against the low value equipment which arrive only when they are required.
  - III. It favors frequent shipment in small lot sizes.
  - IV. Flexible production schedules are prepared by the firm to accommodate any changes based on their requirement and communicated to the suppliers to ensure smooth flow of production.
- (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) (I), (III) and (IV) above.
- (1 mark)
62. Deriving the full advantage of an ERP package requires some amount of organization-wide training. Which of the following statements is/are **true** with respect to providing training? [<Answer>](#)
- I. The steering team should learn how the system performs and how it can be useful in the decision-making process.
  - II. Functional managers should be trained in process analysis and redesign.
  - III. The staff in the IT department should be aware of the package architecture, design and configuration.
- (a) Only (I) above
  - (b) Only (III) above
  - (c) Both (I) and (III) above
  - (d) Both (II) and (III) above
  - (e) All (I), (II) and (III) above.
- (1 mark)
63. An MRP system disassembles the end product into component parts and subassemblies, based on the demand for the end product offering benefits to various types of industries. Which of the following industry derives moderate expected levels of benefits through MRP? [<Answer>](#)
- (a) Assemble-to-stock
  - (b) Fabricate-to-stock
  - (c) Manufacturer-to-order
  - (d) Assemble-to-order
  - (e) Process.
- (1 mark)
64. Operations managers use several techniques to schedule jobs in the various departments. Which of the following statements is **true** regarding techniques used in scheduling? [<Answer>](#)
- (a) Poisson distribution, used in queuing analysis cannot effectively represent real life situations
  - (b) The vertical axis of the workload chart represents the time taken
  - (c) Scheduling charts are not useful when a particular job requires the use of several machines
  - (d) Queuing analysis considers the effects of long queues on new arrivals
  - (e) If the critical ratio of an operation is more than one, the operation is behind schedule.
- (1 mark)
65. Which of the following is **not** a factor that influences the facility decisions, one of the operational issues that demand the attention of the strategy managers in the process of globalization? [<Answer>](#)
- (a) Level of demand for the company's products
  - (b) The market the company wishes to cater to
  - (c) The guidelines and regulations of the country that the company is operating in
  - (d) Investment in promotional activities
  - (e) The infrastructure near the location.
- (1 mark)
66. A computerized system that helps the customers and suppliers or departments within the same organization to share and transmit information electronically in real time using standardized forms of electronic documents is known as [<Answer>](#)
- (a) Electronic Data Interchange (EDI)
  - (b) Computer Integrated Manufacturing (CIM)
  - (c) Computer Aided Manufacturing (CAM)
  - (d) Flexible Manufacturing Systems (FMS)
  - (e) Artificial Intelligence (AI).
- (1 mark)

67. Which of the following is **not** considered a goal of maintenance management? [<Answer>](#)
- (a) Preserve the value of the firm's machinery and equipment by reducing the rate of usage
  - (b) Plan and schedule the maintenance work to anticipate and prevent machine failures and breakdown
  - (c) Increase the firm's productivity
  - (d) Use maintenance personnel and equipment efficiently
  - (e) Minimize the accidents by regular inspection and repairs.
- (1 mark)
68. Reducing the setup time is one of the characteristics of JIT systems. Firms adopt a procedure to reduce setup times. Which of the following is **not true** regarding the said procedure? [<Answer>](#)
- (a) Analyze existing setup procedures
  - (b) Separation of internal and external setup activities
  - (c) Heating, cleaning and streamlining work to enable the conversion of external setup activities into internal setup activities
  - (d) Simplifying the internal activities
  - (e) Replacing the contaminated equipment with the cleaned ones.
- (1 mark)
69. Total Quality Management (TQM) is a philosophy that seeks organization-wide improvement through the involvement of every individual in the organization. Meeting customer requirements, capability of process and standardization to improve quality are the three important aspects related to which of the following TQM principles? [<Answer>](#)
- (a) Systematic improvement
  - (b) Customer focused
  - (c) Continuous improvement
  - (d) Designing quality for products
  - (e) Problem prevention.
- (1 mark)
70. Demand-chain management is a process wherein the consumers provide both the push and the pull. Which of the following is **false** regarding demand chains? [<Answer>](#)
- (a) The focus is mostly on the end-user
  - (b) Consumers are now not only willing to buy from retailers but also from other sources
  - (c) Responsibilities are assumed by the demand chain as a whole
  - (d) In a demand chain, products don't necessarily originate from manufacturers
  - (e) The players in today's emerging demand chains are different from those in traditional supply chains.
- (1 mark)
71. Optez Ltd. uses seven types of materials in its production process. The quantity of each type of material and the cost per unit are as follows: [<Answer>](#)
- | Material type | Quantity used per year (units) | Cost per unit (Rs.) |
|---------------|--------------------------------|---------------------|
| M             | 2,650                          | 22                  |
| N             | 5,925                          | 16                  |
| P             | 1,980                          | 35                  |
| Q             | 5,675                          | 23                  |
| S             | 2,998                          | 25                  |
| X             | 3,468                          | 21                  |
| Y             | 4,254                          | 28                  |
- The type of materials that can be classified as category A are
- (a) N and Q
  - (b) S and X
  - (c) N, Q and Y
  - (d) S, X and P
  - (e) M, Q and S.
- (3marks)

72. Sankari Pvt. Ltd., is trying to create a niche in the fast growing FMCG sector. To attract and retain business, the organization should have a competitive advantage. ERP enables the organization to optimize and organize different qualifiers and order-winners so as to gain competitive advantage in the market. Which of the following is **not** one of the order-winners that apply to most companies?

[<Answer>](#)

- (a) Price
- (b) Delivery reliability and speed
- (c) Quality
- (d) ISO standards
- (e) Product range.

(1 mark)

73. MRP assisting the production department in identifying the quantity, timing and availability of components and parts, and simultaneously placing orders to satisfy the requirements on time, results in accomplishing which of the following objective of the MRP system?

[<Answer>](#)

- (a) Reduction in the investment in inventory
- (b) Improvement in customer service
- (c) Faster response to market changes
- (d) Improvement in operating efficiency
- (e) Reduction in the prices of products.

(1 mark)

74. Sherwin Williams Inc. has five jobs in process with the scheduled delivery requirements as shown below. The work on these jobs has begun 28 days ago by 5 teams comprising of 6 members each. The company uses the critical-ratio scheduling technique.

[<Answer>](#)

Particulars	A	B	C	D	E
Planned days	38	46	39	63	71
Work remaining in days	12	11	9	15	26

The job that is given the least priority is

- (a) A
- (b) B
- (c) C
- (d) D
- (e) E.

(2marks)

75. Which of the following is **not** included under the area of mechanical maintenance in a firm?

[<Answer>](#)

- (a) Maintenance of furnaces
- (b) Maintenance of material handling equipment
- (c) Maintenance of compressors
- (d) Maintenance of motors
- (e) Maintenance of boilers.

(1 mark)

76. Which of the following statements is **not true** regarding the tool used to verify the quality of materials?

[<Answer>](#)

- (a) Acceptance plans are used to verify the quality of both incoming raw materials and outgoing finished materials
- (b) Acceptance sampling is based on average outgoing quality (AOQ) and operating characteristics
- (c) The probability of rejecting a lot at acceptable quality level is referred to as a type II error
- (d) Any lot with a AOQ value of more than AOQ limit should not reach the ultimate customers
- (e) AOQ is indicated by average defects in the lot.

(1 mark)

77. Which of the following is **not** a characteristic of JIT manufacturing system?

[<Answer>](#)

- (a) Closer supplier ties
- (b) Preventive maintenance
- (c) Remedial maintenance
- (d) Maintenance of high quality
- (e) Quick and economic setups.

(1 mark)



78. Following are the means ( $\bar{X}$ ) and range (R) of ten samples each of size 6.

Sample	1	2	3	4	5	6	7	8	9	10
$\bar{X}$	32	48	37	35	46	33	55	47	39	40
R	6	9	5	4	8	6	11	6	5	3

(Conversion factors for sample size 6 are given as  $A_2 = 0.48$ ,  $D_3 = 0$ ,  $D_4 = 2.004$ )

Assuming that an increase in the central limit of the range chart from the given level to 6.93 due to a rise in the number of samples to 12 results in a proportionate increase in the mean of means of the inspected samples, the revised upper and lower control limits for the X - Chart will be

- (a) 42.46, 39.37
- (b) 45.38, 40.79
- (c) 48.65, 41.99
- (d) 49.99, 42.58
- (e) 51.39, 43.65.

(3marks)

79. Which of the following statements are **true** relating to Electronic Supply Chain Management (ESCM) that enables in transforming the way companies deal with each other?

- I. Reducing the communication costs helps in reducing the procurement costs significantly.
- II. Channel partners should be willing to exchange information such as inventory levels, production schedules, forecasts, pricing strategies and promotion plans.
- III. The ESCM implementation team should represent members from the various functions of the organization, representatives from the suppliers and customers.
- IV. The customer base is defined in terms of profitability, size etc.

- (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) All (I), (II), (III) and (IV) above.

(1 mark)

80. Which of the following is **not true** with respect to project crashing?

- (a) The process of reducing the time of the project by reducing the scheduled time of some of the activities is called crashing
- (b) Subcontracting, using the services of overtime labor and adding an extra shift are some of the general approaches for crashing the project time
- (c) The selected activity is crashed till the time reduced is equal to the smallest slack value of the non-critical activities
- (d) The relationship between the project activities is considered to be non-linear for the purpose of calculating the per unit crash cost
- (e) As the project crashing approaches are expensive, managers need to make an analysis of time-cost tradeoffs that reduce the project duration with a minimum increase in cost.

(1 mark)

81. Which of the following statements is **false** relating to maintenance operations that include all those activities that keep production facilities and equipment in operating condition?

- (a) Irregular preventive maintenance includes tasks like repairs, overhauls, and cleaning of spills
- (b) Product-focused organizations lay greater emphasis on efficient remedial maintenance
- (c) Preventive maintenance is time-based whereas predictive maintenance is condition-based
- (d) The set of irregular preventive maintenance activities, which detect problems while the equipment is still performing at a satisfactory level, is referred to as predictive maintenance
- (e) Programs developed under remedial maintenance include activities such as redesigning the malfunctioning equipment, increasing the frequency of preventive maintenance inspections.

(1 mark)

82. The time taken by Mr. Bijoy in responding to the telephone calls is observed by his senior as follows: [<Answer>](#)
- Mr. Bijoy takes no less than 10 minutes for a call and sometimes as much as one hour. Twenty-minute calls are more frequent than calls of any other duration.
- If the calls were an activity in PERT project, the expected duration and variance of the phone calls are
- (a) 20 minutes, 2.78 minutes
  - (b) 20 minutes, 44.44 minutes
  - (c) 25 minutes, 44.44 minutes
  - (d) 25 minutes, 69.44 minutes
  - (e) 45 minutes, 2.78 minutes.
- (2marks)**

83. Which of the following dimensions of quality come under the scope of design function in an organization? [<Answer>](#)
- I. Performance.
  - II. Features.
  - III. Conformance.
  - IV. Perceived quality.
- (a) Both (II) and (III) above
  - (b) Both (III) and (IV) above
  - (c) (I), (II) and (IV) above
  - (d) (II), (III) and (IV) above
  - (e) All (I), (II), (III) and (IV) above.
- (1 mark)**

84. The service personnel of Maruti Service Center, while servicing a car, change the lubricant, rotate the tyres, tune up the engine, replace the key components or overhaul certain systems (if necessary), clean the windows and apply a sticker on the front windscreen that indicates the date of next service. All these activities are aimed at avoiding failure or unsafe operation of the automobile, and hence come under the scope of [<Answer>](#)
- (a) Preventive Maintenance
  - (b) Remedial Maintenance
  - (c) Centralized Maintenance
  - (d) Decentralized Maintenance
  - (e) Contract Maintenance.
- (1 mark)**

85. Forward and backward scheduling are the two methods used for the scheduling of operations. Which of the following statements is/are **true** about backward scheduling? [<Answer>](#)
- I. The start and finish times of the jobs are assigned according to the earliest available time slot.
  - II. The work-in-process inventory is high in this method.
  - III. Orders are scheduled according to their due dates.
- (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)**

**END OF QUESTION PAPER**

## Suggested Answers

### Operations Management - II (MB2E4): January 2009

Answer	Reason	
1.	<p>D Measuring productivity in service organizations is not easy but difficult due to the intangible nature of the product. Hence, statement (I) is false.</p> <p>Poor layout design is a reason for bottleneck in the production process hampering productivity. Hence, statement (II) is true.</p> <p>Inputs for measuring productivity can be viewed in terms of costs associated like material costs, transportation costs, direct costs, overheads etc. Input can also be categorized into tangible and intangible assets. Outputs may be in terms of customers served in a factory, number of customer requests processed in a bank etc. It can also be tangible or intangible. Hence, statement (III) is true.</p>	≤
2.	<p>B According to the AON convention, also referred to as the precedence notation, the following statements are true:</p> <ul style="list-style-type: none"> <li>• Activities are represented by circles with arrows linking them together to show the order of their performance.</li> <li>• The activities are identified with a number or name and dummy activities are generally not used as the network is drawn after all the activities are and their relationships are identified.</li> </ul> <p>Statements (II) and (III) are true for the AOA convention.</p>	≤
3.	<p>C Numerical control robots (NC robots) perform a set of operations based on numerical data that is fed into them through devices like punched tapes, data cards and digital switches.</p>	≤
4.	<p>D In order to achieve the desired standards in business processes, organizations need to reengineer their current processes. The objectives of business process reengineering include reducing process cycle time, reducing the number of decision points, optimizing the information flow between different functions and departments etc. Therefore, option (d) is the answer.</p>	≤
5.	<p>D Scheduling can be either a medium-range planning activity or a short-range planning activity.</p> <p>Forward scheduling is used by wholesalers to replenish the stock.</p> <p>Hence, statements (II) and (IV) are false.</p>	≤
6.	<p>C Reduction in the average number of working hours per week for the worker is a benefit of automation derived through an improvement in the work environment for workers.</p>	≤
7.	<p>D The three elements considered for ensuring people involvement for the successful implementation of JIT in firms are: teamwork, discipline and supplier involvement.</p> <p>A firm adopting the JIT methodology does not encourage a work culture of setting up a separate department for correcting the defects of any worker. Rather, it encourages a culture of correcting a worker's mistakes by himself/ herself. Hence, statement (IV) is a wrong statement.</p> <p>Hence, only statements (I), (II) and (III) relate to the elements considered for people involvement.</p>	≤

- | Answer     | Reason                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |                |                |                |                |                |                |                |   |   |    |  |  |                |                |                |                |                |                |                |    |  |  |  |  |                |  |                |                |                |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---|---|----|--|--|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----|--|--|--|--|----------------|--|----------------|----------------|----------------|
| 8. B       | If a country reduces its duties, these rules will be equally applicable to all member nations of the WTO, i.e., it is dependent on the membership of the countries. Hence, the given statement is false. ≤                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |            |                |                |                |                |                |                |                |   |   |    |  |  |                |                |                |                |                |                |                |    |  |  |  |  |                |  |                |                |                |
| 9. E       | It is ideal for organizations to have fewer facilities catering to different markets. Hence, the given statement is false. ≤<br>Hence, statements (I), (II) and (IV) are true.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |            |                |                |                |                |                |                |                |   |   |    |  |  |                |                |                |                |                |                |                |    |  |  |  |  |                |  |                |                |                |
| 10. C      | Workplace planning, allocation and management function includes workplace planning and design of the workplace based on equipment specification, type of furniture etc. ≤                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |            |                |                |                |                |                |                |                |   |   |    |  |  |                |                |                |                |                |                |                |    |  |  |  |  |                |  |                |                |                |
| 11. B      | Projects with a predetermined completion time imply that they have a fixed finish date. Many organizations generally prefer to work backwards to complete a project on time when the finish date is fixed. ≤                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |            |                |                |                |                |                |                |                |   |   |    |  |  |                |                |                |                |                |                |                |    |  |  |  |  |                |  |                |                |                |
| 12. D      | Backward Scheduling: ≤<br><table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Time (Hrs)</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> </tr> </thead> <tbody> <tr> <td>M1</td> <td></td> <td></td> <td>N<sub>1</sub></td> <td>N<sub>1</sub></td> <td>N<sub>1</sub></td> <td>B<sub>2</sub></td> <td>B<sub>2</sub></td> <td>N<sub>3</sub></td> <td>N<sub>3</sub></td> </tr> <tr> <td>M2</td> <td></td> <td></td> <td></td> <td></td> <td>B<sub>1</sub></td> <td></td> <td>N<sub>2</sub></td> <td>B<sub>3</sub></td> <td>B<sub>3</sub></td> </tr> </tbody> </table> <p>Here, the job of producing 600 nuts can start latest in the 3<sup>rd</sup> hour, and the job for producing 600 bolts can start latest in the 5<sup>th</sup> hour, using the given sequence and machines so as to finish them by the end of 9 hours.</p> | Time (Hrs) | 1              | 2              | 3              | 4              | 5              | 6              | 7              | 8 | 9 | M1 |  |  | N <sub>1</sub> | N <sub>1</sub> | N <sub>1</sub> | B <sub>2</sub> | B <sub>2</sub> | N <sub>3</sub> | N <sub>3</sub> | M2 |  |  |  |  | B <sub>1</sub> |  | N <sub>2</sub> | B <sub>3</sub> | B <sub>3</sub> |
| Time (Hrs) | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2          | 3              | 4              | 5              | 6              | 7              | 8              | 9              |   |   |    |  |  |                |                |                |                |                |                |                |    |  |  |  |  |                |  |                |                |                |
| M1         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            | N <sub>1</sub> | N <sub>1</sub> | N <sub>1</sub> | B <sub>2</sub> | B <sub>2</sub> | N <sub>3</sub> | N <sub>3</sub> |   |   |    |  |  |                |                |                |                |                |                |                |    |  |  |  |  |                |  |                |                |                |
| M2         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |                |                | B <sub>1</sub> |                | N <sub>2</sub> | B <sub>3</sub> | B <sub>3</sub> |   |   |    |  |  |                |                |                |                |                |                |                |    |  |  |  |  |                |  |                |                |                |
| 13. E      | A conveyance card includes details of: ≤<br><ul style="list-style-type: none"> <li>• Product name</li> <li>• Identification name</li> <li>• Delivery destination.</li> </ul> <p>Details of the quantity ordered is not included in the conveyance card, rather it is included in the vendor authorization card.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |            |                |                |                |                |                |                |                |   |   |    |  |  |                |                |                |                |                |                |                |    |  |  |  |  |                |  |                |                |                |
| 14. B      | The key aspect of ERP is its ability to integrate different business entities without being constrained by geographical and functional differences. Managerial differences is not one of those key aspects. ≤                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |            |                |                |                |                |                |                |                |   |   |    |  |  |                |                |                |                |                |                |                |    |  |  |  |  |                |  |                |                |                |
| 15. D      | Developing the production plan is the responsibility of the managers at the upper-management level generally carrying out the product planning functions. ≤<br>It is not an activity involved in carrying out the operations control functions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |                |                |                |                |                |                |                |   |   |    |  |  |                |                |                |                |                |                |                |    |  |  |  |  |                |  |                |                |                |
| 16. D      | Preventive, concurrent and feedback control approaches are used for quality control. ≤                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |                |                |                |                |                |                |                |   |   |    |  |  |                |                |                |                |                |                |                |    |  |  |  |  |                |  |                |                |                |

	<b>Answer</b>	<b>Reason</b>	
17.	A	Computer Aided Design incorporates computer graphics and computer-aided engineering systems.	≤
18.	A	Purchase department is benefited in the form of increased focus on activities like vendor selection, sourcing and managing relationships with vendors/suppliers through instant access to information to the suppliers.	≤
19.	D	Organizations give highest priority to jobs with the shortest processing time to keep a lower number of jobs in waiting and maximize the number of jobs. Hence, statement (II) is false. Statements (I), (III) and (IV) are true. Hence, option (d) is the answer.	≤
20.	E	JIT firms should provide enough time to their suppliers so that they can respond to changes in demand. To fulfill this, suppliers have to purchase new machinery, add more machinery and equipment, hire and train labor etc., in line with the requirements of JIT firm.	≤
21.	C	Out-tasking is referred to as hiring of individual, specialized vendors. It supplements in-house delivery capability with sub-contracted expertise or capacity. Statement (II) relates to outsourcing.	≤
22.	D	Materials management does not mean stocking large amounts of materials to avoid the problem of a shortfall of material. Making more investment in materials than required is highly uneconomical for a firm because of the high costs involved in storage and maintenance. Therefore, firms should monitor carefully the entire material flow process so that there is no shortage of materials, and they are available at the right time, right place and in the right quantity. Hence, statement (I) is false. Materials management contributes to the quality of the end product or service. As materials management covers the execution of functions like purchasing, inventory control and material handling in a firm, the quality of the end product is dependent on it. Hence, the given statement that quality of the end product is independent of the materials management in a firm is false. A reduction in the costs on current assets i.e., the materials of the firm results in an increase in the return on investment of the firm. Hence, statement (IV) is false. Statement (II) is true. Hence, the answer is option (d).	≤
23.	B	Business modeling, which is a precursor to business process reengineering and ERP implementation, is a diagrammatic representation of different business systems and processes, and their interconnections and interdependencies. Providing a general overview of the business without going in to the technical details of the processes and systems is an objective of business modeling. Hence, option (b) is the answer.	≤

<b>Answer</b>	<b>Reason</b>	
24. A	<p>Quantity of X to be produced = 450 units</p> <p>∴ Quantity of A required to produce 450 units of X = <math>450 \times 2 = 900</math> units</p> <p>Available inventory of A = 125 units</p> <p>Qty. of A to be produced = Qty. required – Available inventory = <math>900 - 125 = 775</math> units</p> <p>2 units of D are required to produce 1 unit of A.</p> <p>Hence, <math>1,550 (775 \times 2)</math> units of D are required to produce 775 units of A.</p> <p>Quantity of B required to produce 450 units of X = <math>450 \times 3 = 1,350</math> units</p> <p>Available inventory of B = 112 units</p> <p>Qty. of B to be produced = Qty. required – Available inventory = <math>1,350 - 112 = 1,238</math> units</p> <p><math>3 (1 \times 3)</math> units of D are required to produce 1 unit of B.</p> <p>Hence, <math>3,714 (1,238 \times 3)</math> units of D are required to produce 1,238 units of B.</p> <p>Quantity of C required to produce 450 units of X = <math>450 \times 1 = 450</math> units</p> <p><math>6 (3 \times 2)</math> units of D are required to produce 1 unit of C.</p> <p>Hence, <math>2,700 (450 \times 6)</math> units of D are required to produce 450 units of C.</p> <p>∴ Total qty. of D required to produce 450 units of X = <math>1,550 + 3,714 + 2,700 = 7,964</math> units.</p>	≤
25. D	<p>An option wherein the employees can choose their start time, working for eight hours each day is given in flextour, one of the personnel-related scheduling approaches is true.</p> <p>All other statements are false.</p> <p>(a) Job operations involve the production of products or services in low volumes.</p> <p>(b) JIT principles and queuing analysis are used to schedule the repetitive operations, but not Gantt charts and critical ratio methods. They are used in scheduling the job operations.</p> <p>(c) Scheduling the repetitive operations focuses on synchronizing the customer demand with the production activities of the firm.</p> <p>(e) Part-time work derives advantages to firms in the form of reduced personnel costs and improved performance of the firm. Hence, the given statement is false.</p> <p>Hence, option (d) is the answer.</p>	≤
26. D	<p>Organizations can achieve a cost advantage by centralizing their production and catering to a large customer base.</p> <p>All other statements are true.</p>	≤
27. D	<p>Customers should be segmented based on their service needs, but not the trade channel. Hence, statement (I) is false.</p> <p>In the medium term, IT should help in planning and decision making and effective resource allocation through a master production schedule. Master production schedule is prepared for a short or medium term to identify the weekly requirements of products.</p> <p>In the long term, IT should provide top managers with tools for strategic analysis. Hence, statement (IV) is false.</p> <p>Statements (II) and (III) are true. Hence, answer is (d).</p>	≤

<b>Answer</b>	<b>Reason</b>	
28. C	Indirect Computer Aided Manufacturing is used by operations managers for activities such as capacity planning, purchasing, inventory control, quality reporting etc.	≤
29. C	The quality dimension where the customers rely heavily on the reputation of the organization and the past performance of its products when attaching a value to its new products is perceived quality.	≤
30. E	<p>The various paths from this network are:</p> $1 - 4 - 8 - 9 - 10 = 36 + 2 + 20 + 20 = 78 \text{ weeks}$ $1 - 2 - 3 - 8 - 9 - 10 = 4 + 2 + 10 + 20 + 20 = 56 \text{ weeks}$ $1 - 2 - 3 - 5 - 8 - 9 - 10 = 4 + 2 + 15 + 9 + 20 + 20 = 70 \text{ weeks}$ $1 - 2 - 3 - 5 - 6 - 7 - 9 - 10 = 4 + 2 + 15 + 4 + 9 + 8 + 20 = 62 \text{ weeks}$ $1 - 2 - 3 - 5 - 6 - 7 - 8 - 9 - 10 = 4 + 2 + 15 + 4 + 9 + 9 + 20 + 20 = 83 \text{ weeks}$ <p>∴ The completion time of this project is 83 weeks.</p>	≤
31. B	<p>U-shape layout makes the system more flexible, making it easy to change the production level in response to changes in demand. Hence statement (I) is false.</p> <p>When a defect is observed at a work center, it cannot be passed to the next work center without correcting. This results in the stoppage of production at the downstream work centers. Hence, statement (II) is false.</p> <p>Keeping the materials in cells ensures minimum movement resulting in reduced material-handling costs, but not keeping them in functional departments. Hence, statement (III) is false.</p> <p>Only statement (IV) is true.</p>	≤
32. C	<p>The finished goods inventory department is involved in the inventory control function to carry out the task of checking the quantity and quality of the products in the production process, storing the products to protect them from pilferage and other damage, auditing the finished goods inventory, and locating and retrieving the finished goods from stocks. It is not a department involved in the production control function.</p> <p>Hence, option (a) is false.</p> <p>The tasks of the receiving department include unpacking the incoming materials, checking their quantity and quality, and generating the receiving reports. Identifying and selecting the vendors to obtain the materials required is the task of the purchasing department.</p> <p>Hence, option (b) is false.</p> <p>Computing the storing capacity required in the department and adjusting it to maintain a smooth flow of work is the task performed by the production department, but not the raw materials inventory department.</p> <p>Hence, option (d) is false.</p> <p>The overlapping of the raw materials inventory and production departments can cause conflicts in the execution of the two functions of production control and inventory control.</p> <p>Hence, option (e) is false.</p> <p>Option (c) is the answer.</p>	≤

- | <b>Answer</b> | <b>Reason</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>≤</b> |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 33. C         | The selected ERP package should be scalable and should support open and non-proprietary technology standards.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | ≤        |
| 34. B         | A MRP system may be misleading in providing an estimate of the lead-time. Hence, it is not an advantage of the MRP system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ≤        |
| 35. B         | $B_t =$ Expected number of breakdowns. <span style="float: right;">≤</span><br>$C_p =$ Average cost of preventive maintenance = Rs.1,385<br>$C_R =$ Cost of remedial maintenance = Rs.8,765<br>$N =$ Number of machines<br>$t =$ Time period<br>$B_t = N(P_1 + P_2 + P_3 + \dots + P_t) + B_{t-1}P_1 + B_{t-2}P_2 + \dots + B_1P_{t-1}$<br>$N = 12$ and $t = 4$<br>$B_1 = NP_1 = 12 \times 0.1 = 1.2$<br>$B_2 = N(P_1 + P_2) + B_1P_1 = 12(0.1 + 0.2) + 1.2(0.1) = 3.6 + 0.12 = 3.72$<br>$B_3 = N(P_1 + P_2 + P_3) + B_2P_1 + B_1P_2 = 12(0.1 + 0.2 + 0.3) + 3.72(0.1) + 1.2(0.2)$<br>$= 7.2 + 0.372 + 0.24 = 7.812$<br>$N(P_1 + P_2 + P_3 + P_4) + B_3P_1 + B_2P_2 + B_1P_3$<br>$12(0.1 + 0.2 + 0.3 + 0.4) + 7.812(0.1) + 3.72(0.2) + 1.2(0.3)$<br>$B_4 = 12(1.0) + 7.812(0.1) + 3.72(0.2) + 1.2(0.3)$<br>$= 12 + 0.7812 + 0.744 + 0.36 = 13.8852 \approx 13.88$<br>Hence, expected number of breakdowns in the 4 <sup>th</sup> quarter = 13.88<br>Total cost of maintenance for every 4 quarters = TC(4)<br>$= C_p N + C_R B_t = (1385 \times 12) + (8765 \times 13.88) = 16,620 + 1,21,658.2 = \text{Rs. } 1,38,278.2$<br>Average total cost per period = TC(t) / t<br>$\therefore$ Average total cost per quarter = TC (4) / 4 = 1,38,278.2 / 4 = Rs. 34,569.55.<br>$\therefore$ Average total cost per month = Average total cost per quarter / Number of months in a quarter<br>$= 34,569.55 / 3 = 11,523.18 \approx \text{Rs. } 11,523.$ | ≤        |
| 36. D         | Hospitals and airlines engaged in rendering service facilities meet peak demand not by engaging part-time workers but by adopting either of the three systems such as - reservation systems, appointment systems and strategic product pricing. <span style="float: right;">≤</span><br>Reservation systems are used to schedule multiple resources required together to meet the demands of several customers.<br>Appointment systems are useful in non-emergency situations.<br>Strategic product pricing is a scheduling approach that helps firms adjust to shifts in demand.<br>Hence, statements (I), (III) and (IV) are true.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ≤        |



	<b>Answer</b>	<b>Reason</b>	
37.	D	Governmental pressure to engage in local R&D is a reason for institutional impediments faced by organizations intending to operate globally.	≤
38.	B	Earlier, organizations considered market share as a good measure of profitability, but now they are redefining their competitive spaces as a significant market share cannot ensure the profitability of a company because of the change in the competitive space. Hence, option (b) is false. All other statements are true.	≤
39.	C	A FMS consists of different layouts such as progressive layout, closed loop layout, ladder layout and open field layout. Hybrid layout is not one of them.	≤
40.	A	Adoption of an optimal mix of factors of production leads to allocative efficiency.	≤
41.	D	Conveyors can be classified as fixed path equipment. All others are examples of variable-path materials-handling equipment.	≤
42.	D	Focusing on target market will enable the group to reduce the customization efforts required. When selecting an ERP package, the type of industry – process or discrete – it is designed for, should also be considered. If the package is designed for a particular type of industry, it is likely that it will have several industry-specific features. It reduces the customization efforts required.	≤
43.	D	Planned orders, order releases and changes in due date are the primary reports generated by the MRP system that the new manager has to assess.	≤
44.	D	Some of the operational benefits that firms can derive from the use of JIT systems are: <ul style="list-style-type: none"> <li>• Increased utilization of machinery and equipment</li> <li>• Reduced investment in inventory</li> <li>• Improvement in the quality of product or service</li> <li>• Reduction in space requirements of the firm</li> <li>• Reduction in production cycle time</li> <li>• Zero inventory storage and maintenance costs</li> <li>• Closer relationship with suppliers</li> <li>• Reduction in formal paper work</li> <li>• Higher involvement of employees as they are responsible for the quality of goods that they produce.</li> </ul> Hence, option (d) is the answer.	≤

**Answer****Reason**

45. D Organizations need to have a proper control mechanism to ensure the success of facilities in foreign countries i.e., they need to focus on the procedures and planning and in the process require to maintain a balance between authority, responsibility and accountability for smooth operations. ≤

46. C Option (c) is true. ≤  
 During the first stage of infant mortality, the probability of failure is very high but decreases rapidly. Hence, option (a) is false.  
 If organizations are unable to fulfill the maintenance activities they adopt contract maintenance which does not warrant the involvement of the in-house maintenance department. Hence, option (b) is false.  
 During the wear out stage, organizations go in for a replacement of the system. Hence, option (d) is false.  
 Causes for failure during the adult stage can be attributed to external causes or accidents. Hence, option (e) is false.

47. D ≤

Job Sequence	Processing Times	Due date	Flow time	Delay
S5	3	4	$0 + 3 = 3$	0
S1	4	6	$3 + 4 = 7$	1
S3	5	7	$7 + 5 = 12$	5
S2	6	8	$12 + 6 = 18$	10
S4	5	9	$18 + 5 = 23$	14

From the given information, the order of the jobs as per the dispatching rule, earliest due date is

S5 – S1 – S3 – S2 – S4.

Average delay of a job =  $(0 + 1 + 5 + 10 + 14)/5 = 30/5 = 6$  days.

48. B Operational planning, one of the components of SCM lists the functions such as commodity planning, planning for supplier evaluation, certification processes etc. ≤

49. C Field survey costs and downtime costs come under the purview of cost of failure. ≤

50. B Additional cost ≤  
 $= (3 \times 25) + (5 \times 33) + (6 \times 46) + (4 \times 29) = 75 + 165 + 276 + 116 = \text{Rs. } 632$

51. B The sequence of actions of fixed sequence robots are usually triggered by electronic sensors. ≤

**Answer****Reason**

52. A Test runs are conducted to see the performance of the system after customization and master data transfer. ≤

53. C The information obtained from explosion and netting processes are used to determine the planned order releases. Hence, the given statement is false. ≤

54. C Numerical control method is used in robotics. ≤  
All other statements are true.

55. D ≤

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
4	3	4	3	2	5	3

The two consecutive days with the lowest numbers (lowest pair) are identified. The lowest pair is the pair in which the highest number of the pair is less than or equal to the highest number of any other pair. The numbers against Thursday and Friday are low and satisfy this condition.

∴ Faculty A is assigned offs on Thursday and Friday.

56. B The reduction in the cycle inventory, cut in lead times and also reduction in the waiting time in the production processes are the advantages of small lot sizes. ≤

57. B If the client organization passes over control of its facilities to an external agency, it may lose the power to control any deviations in the performance of the vendors. ≤

58. C ≤

$$\bar{c} = \frac{\sum c}{n} = \frac{73}{12} = 6.083$$

If the average number of defects is 62.5% more than the current average of 6.083, then the new average is  $6.083 (1 + 0.625) = 9.88$

Control limits for a number of defects chart or C-chart are:

$$\text{UCL is } \bar{c} + 3\sqrt{\bar{c}}$$

$$\text{LCL is } \bar{c} - 3\sqrt{\bar{c}}$$

Control limits for this process are given by:

$$\text{UCL} = 9.88 + 3\sqrt{9.88} = 9.88 + 9.42 = 19.30$$

$$\text{LCL} = 9.88 - 3\sqrt{9.88} = 9.88 - 9.42 = 0.46$$

∴ The UCL and LCL values for the C-Chart as per the revised average are 19.30 and 0.46.

	<b>Answer</b>	<b>Reason</b>	
59.	D	Periodic review is not restricted to self-contained processes like the purchase order process, but is undertaken for complete SCM processes like the order-to-delivery process.	≤
60.	B	Statements (I) and (IV) represent the critical path method correctly. Statement (II) is incorrect with respect to the CPM. Statement (III) represents the PERT.	≤
61.	C	In this system, the firm ensures that the high value components and materials arrive only when they are required. Hence, the statement (II) is false. Stable production schedules are developed and communicated to the suppliers to ensure smooth flow of production. Hence, statement (IV) is false. Statements (I) and (III) are true. Hence, option (c) is the answer.	≤
62.	B	The steering team should be trained in process analysis and redesign and the functional managers should learn how the system performs and how it can be useful in the decision-making process. Hence, only statement (III) is true.	≤
63.	E	MRP is useful for organizations involved in the production of complex products, organizations working with shorter delivery schedules, job-shops and assemble-to-order organizations. The expected levels of benefits are medium or moderate for the process industry. From the above information, option (e) is correct.	≤
64.	A	Queuing analysis, which uses poisson distribution, cannot effectively represent real life situations. Hence option (a) is true. All other options are false.	≤
65.	D	Investment by a global firm in promotional activities is not a factor influencing the facility decisions of a global organization.	≤
66.	A	EDI is a system, wherein standardized forms of electronic documents are transferred between two computer systems. Customers and suppliers or departments within the same organization can share and transmit information electronically in real time using EDI.	≤
67.	A	The value of a firm's machinery and equipment should be preserved by reducing the rate of deterioration, but not by reducing the rate of usage. The firm's assets should be put to maximum usage during the production process.	≤

**Answer****Reason**

68. C Procedures such as heating, cleaning and streamlining work are used of enable the conversion of internal setup activities into external setup activities. Hence, option (c) is the answer. ≤

69. D Designing quality for products is the principle of TQM in which the three important aspects of design quality are: meeting customer requirements, capability of process and standardization to improve quality. ≤

70. E A common misconception about demand chain thinking is that consumers always buy from retailers. Though consumers often buy from retailers, they are also searching for new ways to obtain products and services. Increasingly, they are showing a willingness to buy from any entity in the supply channel that will give them value pricing, quality products and efficient delivery systems. ≤

Hence, option (b) is true.

The players in today's emerging demand chains are same as those in traditional supply chains.

Hence, option (e) is false in relation to demand chain.

71. C ≤

Material type	Quantity used per year (units)	Cost per unit (Rs.)	Usage value (quantity used × cost per unit)	Percentage of usage value	Cumulative value
M	2,650	22	58,300	9.41	9.41
N	5,925	16	94,800	15.29	24.7
P	1,980	35	69,300	11.18	35.88
Q	5,675	23	1,30,525	21.06	56.94
S	2,998	25	74,950	12.09	69.03
X	3,468	21	72,828	11.75	80.78
Y	4,254	28	1,19,112	19.22	100
<b>Total</b>			6,19,815	100	

From the above table, it can be inferred that materials of type Q, Y and N can be classified under category A, as they account to more than 50% of costs and are allocated to only 40% of the materials.

72. D Some of the order-winners that apply to most companies are: price; delivery reliability and speed; quality, and product range. An ISO standard is not an order winner but an order qualifier for most companies in the current era of globalization. ≤

73. B To improve customer service, organizations need to fulfill delivery promises. MRP assists the production department in doing that by identifying the quantity, timing and availability of components and parts, and by simultaneously placing orders to satisfy the requirements on time. ≤

**Answer**

**Reason**

74. D Critical ratio = Planned time remaining / Actual work remaining. ≤  
 Planned time remaining = Originally scheduled time (-) Time elapsed since beginning the work.

Particulars	A	B	C	D	E
Planned days	38	46	39	63	71
Work remaining in days	12	11	9	15	26

Jobs	Planned time remaining	Actual work remaining	Critical Ratio	Priority Order
A	38 – 28 = 10	12	10 / 12 = 0.83	1
B	46 – 28 = 18	11	18 / 11 = 1.64	3
C	39 – 28 = 11	9	11 / 9 = 1.22	2
D	63 – 28 = 35	15	35 / 15 = 2.33	5
E	71 – 28 = 43	26	43 / 26 = 1.65	4

The lower the critical ratio, the higher the priority needed in sequencing the job in the next day's production activities. From the table, it can be observed that job D has the highest critical ratio (ahead of schedule) and thus the lowest priority.

75. D Maintenance of motors comes under the purview of electrical maintenance. ≤

76. C The probability of rejecting a lot at acceptable quality level is referred to as a type I error. ≤  
 Hence, option (c) is the answer.

77. C JIT manufacturing system believes in the concept of preventive maintenance. ≤  
 Hence, option (c) is the answer.

78. C 
$$R = \frac{\sum R}{n} = \frac{63}{10} = 6.3$$
 ≤

The central limit of the range chart has increased from the current level to 6.93, which represents a 10% rise.

$$\bar{X} = \frac{\sum \bar{X}}{n} = \frac{412}{10} = 41.2$$

If the mean of samples increases in the same proportion as that of the central limit of the range chart, then the mean of means of samples i.e.,  $\bar{X}$  would increase to 45.32 (41.2 + 10% rise)

$$UCL = \bar{X} + A_2 \bar{R} = 45.32 + (0.48 \times 6.93) = 48.65$$

$$LCL = \bar{X} - A_2 \bar{R} = 45.32 - (0.48 \times 6.93) = 41.99$$

<b>Answer</b>	<b>Reason</b>	
79. D	<p>Instant access to information, enabled through ESCM helps in reducing the communications costs. Hence, the given statement that reducing the communication costs helps in reducing the procurement costs significantly is true.</p> <p>All channel partners should be willing to exchange information such as inventory levels, production schedules, forecasts, promotion plans etc. Companies do not share information about their pricing strategies. Hence, statement (II) is false.</p> <p>Hence, option (d) is the answer.</p>	≤
80. D	<p>The relationship between the project activities is assumed to be linear for the purpose of simplicity and calculating the per unit crash cost.</p>	≤
81. B	<p>Product-focused organizations and highly automated production units emphasize preventive maintenance to avoid frequent equipment breakdowns, as the failure of a component of equipment results in the entire production system or major part of it remaining idle.</p> <p>On the other hand, process-focused organizations lay greater emphasis on efficient remedial maintenance.</p>	≤
82. D	<p>From the given information,</p> <p>Optimistic time = <math>t_o = 10</math> minutes  Most likely time = <math>t_m = 20</math> minutes  Pessimistic time = <math>t_p = 60</math> minutes  Expected duration of the phone call (<math>t_e</math>)</p> $= \frac{t_o + t_p + 4t_m}{6} = \frac{10 + 60 + (4 \times 20)}{6} = 150 / 6 = 25 \text{ minutes}$ $\text{Variance} = \left\{ \frac{t_p - t_o}{6} \right\}^2 = \left\{ \frac{60 - 10}{6} \right\}^2 = 2500/36 = 69.44 \text{ minutes.}$	≤
83. C	<p>Performance, features and perceived quality are the dimensions of quality that come under the scope of the design function.</p> <p>Conformance comes under the scope of manufacturing function.</p> <p>Hence, option (c) is the answer.</p>	≤

<b>Answer</b>	<b>Reason</b>
84.    A	<p>Preventive Maintenance includes maintenance activities performed to keep the equipment in working condition before it breaks down. It includes regular inspection of equipment and facilities to assess their working condition and take corrective action, whenever necessary. The corrective actions generally include tasks like machine adjustments, lubrication, cleaning, replacement of parts and painting. <span style="float: right;">≤</span></p> <p>Hence, option (a) is correct.</p> <p>Option (b) is incorrect. Remedial Maintenance includes activities that restore facilities and equipment to an acceptable working condition after a breakdown or malfunction has occurred or the normal operations hindered. So, it is not applicable here.</p> <p>Option (c) is incorrect. In Centralized Maintenance, there is one large maintenance department for the whole company. So, it is not applicable here.</p> <p>Option (d) is incorrect. In Decentralized Maintenance, there are small maintenance departments for each part of the company. Such departments may be justified if each part of the company needs a different special skill, special equipment, or very rapid response. So, it is not applicable here.</p> <p>Option (e) is incorrect. Contract Maintenance involves giving maintenance work to outsiders on a contract basis. Occasionally, highly specialized or seasonal maintenance work may be contracted. So, it is not applicable here.</p>
85.    C	<p>The backward scheduling method schedules orders according to their due dates. The operations manager obtains the due dates for the job orders and develops the schedule backwards, thereby determining the latest point when the production activity can be started in order to complete the order on time. Hence, statement (III) is true. <span style="float: right;">≤</span></p> <p>Statements (I) and (II) are true for forward scheduling.</p>

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