Question Paper
Operations Management - II (MB2E4-02): October 2010

- Answer all 89 questions.
- Marks are indicated against each question.

Total Marks : 100

1. The wire frame model helps Computer Aided Design (CAD) in

   (a) Highlighting the operational capabilities
   (b) Representing the parts in desirable forms
   (c) Producing more standardized products
   (d) Controlling processing equipment
   (e) Monitoring production process. **(1 mark)**

2. Which of the following is defined as a combination of complementary skills and knowledge bases embedded in a group or team that results in the ability to execute one or more critical processes to a world-class standard?

   (a) Competitive advantage
   (b) Proprietary technology
   (c) Process efficiency
   (d) Operations strategy
   (e) Core competency. **(1 mark)**

3. Firms invest a significant portion of their capital in materials, and hence, it needs to be managed effectively and efficiently. The factor(s) responsible for the increasing cost of materials is/are

   I. Scarcity of resources.
   II. Increasing internal set-up costs.
   III. Increasing demand.

   (a) Only (II) above
   (b) Only (III) above
   (c) Both (I) and (II) above
   (d) Both (I) and (III) above
   (e) Both (II) and (III) above. **(1 mark)**

4. Critical Path Method (CPM) helps project managers track various activities of the project and enables the identification of the critical activities of the project. Which of the following statements are **true** with reference to CPM?

   I. It is used for 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)**

5. The Supply Chain Management (SCM) enabler, which ensures that stakeholders and business processes work towards consciously determined and mutually recognized goals and objectives, is referred to as

   (a) Alignment
   (b) Customer-supplier focus
   (c) Design
   (d) Measurement
   (e) Periodic review. **(1 mark)**

6. The costs that incur in tests and inspection of products and machines throughout the transformation process is referred to as

(a) Costs of transformation
(b) Costs of failure
(c) Costs of prevention
(d) Costs of evaluation
(e) Costs of detection. **(1 mark)**

7. The activities on critical path are only crashed. Which of the following is/are the reason(s) responsible for this?

I. All the activities of critical path have zero float value.
II. All the activities of critical path consume less resource.
III. All the activities of critical path begin and end with single node.

(a) Only (I) above
(b) Only (II) above
(c) Only (III) above
(d) Both (I) and (III) above
(e) Both (II) and (III) above. **(1 mark)**

8. Electronic Supply Chain Management (ESCM) ensures that the organizations get timely and accurate forecasts regarding the demand of product or service and helps in developing proper production plan based on actual requirements. Which of the following benefits would accrue to the organizations in the given scenario?

I. Increase in replenishment cycle time.
II. Reduction in stockout costs.
III. Improved accuracy in order fulfillment.

(a) Only (III) above
(b) Both (I) and (II) above
(c) Both (I) and (III) above
(d) Both (II) and (III) above
(e) All (I), (II) and (III) above. **(1 mark)**

9. Which of the following identifies production bottlenecks and minimizes them to avoid production delays?

(a) Purchasing department
(b) Receiving department
(c) Raw materials inventory department
(d) Production department
(e) Finished goods inventory department. **(1 mark)**

10. In which of the following industry, are items manufactured directly by machines rather than assembled by parts, and stored in stock points to meet the anticipated customer demand?

(a) Assemble-to-stock
(b) Fabricate-to-stock
(c) Assemble-to-order
(d) Fabricate-to-order
(e) Manufacturer-to-order. **(1 mark)**

11. Scheduling of operations is essential for all firms as it helps them maximize customer satisfaction and minimize service delays. Which of the following will be the probable result(s) of scheduling low capacity?

I. Incomplete jobs at the specified time.
II. Facilities remain idle.
III. Poor service to customers.

(a) Only (I) above
(b) Only (II) above
(c) Both (I) and (II) above
(d) Both (I) and (III) above
(e) Both (II) and (III) above. **(1 mark)**

12. The difficulties involved in transporting products and accessing established distribution channels that impede the process of globalization are the examples of

(a) Economic impediment
(b) Managerial impediment
(c) Institutional impediment
(d) Cultural impediment
(e) Technical impediment. **(1 mark)**

13. The concept applicable to all control charts is that different measurement criteria are plotted on the chart with a central line representing the mean value and two control limits above and below that central value. Which of the following statement(s) is/are **true** about R-chart?

I. It is employed to find out the proportion of defective items in a selected sample.
II. It is used to check the process variability.
III. It illustrates the central tendency of the inspected samples.

(a) Only (I) above
(b) Only (II) above
(c) Only (III) above
(d) Both (I) and (III) above
(e) Both (II) and (III) above. **(1 mark)**

14. In which of the following conditions, the selected activity of a project is crashed to the maximum possible extent?

I. The activity time is at its minimum possible value.
II. The time reduced is equal to the smallest slack value of the critical activities.
III. The reduced time is equal to the desired project completion time.

(a) Only (I) above
(b) Only (II) above
(c) Both (I) and (II) above
(d) Both (I) and (III) above
(e) Both (II) and (III) above. **(1 mark)**

15. Which of the following dimensions of quality cater to a niche market?

(a) Aesthetics
(b) Performance
(c) Reliability
(d) Durability
(e) Conformance. **(1 mark)**

16. The observation of the failure pattern of 31 identical machines in a workshop is given below.

Elapsed time after last maintenance in months	Probability of failure
1	0.05
2	0.15
3	0.15
4	0.05
5	0.05
6	0.1
7	0.1
8	0.05
9	0.1
10	0.05
11	0.05
12	0.1

Calculate the number of breakdowns per year from the above observation.

(a) 56.54
(b) 58.67
(c) 60.98
(d) 62.33
(e) 63.44. **(2 marks)**

17. Loading can be defined as 'assigning specific jobs to each work center for the planning period.' In which of the following conditions, the activity of loading aims at minimizing costs?

(a) When the capacity limitation is not critical
(b) When the layout structure is not given importance in scheduling
(c) When the job orders are not released in accordance with the planned sequence
(d) When the product specifications are not clearly mentioned
(e) When the job orders are not properly sequenced. **(1 mark)**

18. Process mapping can be helpful in detailing the processes. Which of the following statements is/are **true** related to process mapping?

I. It provides information about the time taken to complete a process.
II. It provides information about the number of decision points in business transactions.
III. It sets performance standards for each process.

(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)**

19. Which of the following drivers of Supply Chain Management (SCM) affects the performance of other drivers and help organizations to improve their forecasting mechanism and makes the supply chain more effective and responsive to market demand?

(a) Inventory
(b) Transportation
(c) Facilities
(d) Information
(e) Price. **(1 mark)**

20. Bills of Material (BOM) contain the list of materials along with the quantity required to produce one unit of a product. Which of the following is/are **not true** related to BOM?

I. It provides information regarding make or buy decision.
II. It advocates skipping sequences and emphasizes on quality control.
III. It shows hierarchical levels of production process.

(a) Only (I) above
(b) Only (II) above
(c) Only (III) above
(d) Both (I) and (III) above
(e) Both (II) and (III) above. **(1 mark)**

21. Process-focused organizations lay greater emphasis on efficient remedial maintenance. Which of the following steps is/are taken by process-focused organizations to cover the production loss due to breakdowns?

I. They automate their processes.
II. They reduce replacement costs through repair activities.
III. They possess in-process inventories.

(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)**

22. Managing globalization is a difficult task as it involves coordinating the efforts of managers of various international subsidiaries of a multinational organization to achieve global benefits. Which of the following statements is/are **not true** regarding the approaches of managing globalization?

I. Organizational structures are required to be redefined for handling the requirements of globalization effectively.
II. Organizations conduct various training sessions at many levels to change the attitude of managers.
III. Organizations follow uniform approaches for managing their core competencies for capital base and strategic business units.

(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)**

23. Which of the following documents empower the purchase department to procure a specific quantity of inventory items required within a specific period?

(a) Planned orders
(b) Order releases
(c) Planning reports
(d) Performance reports
(e) Exception reports. **(1 mark)**

24. Which of the following determines the physical movement capability of robot's hands?

(a) Work envelope
(b) Grippers
(c) Automated pallet movers
(d) Automated guided vehicles
(e) Numerical control system. **(1 mark)**

25. Which of the following should be focused by the organizations to fulfill the growing expectations of customers?

I. They should make a balance between cost and quality.
II. They should meet the average service requirements of all customers.
III. They should concentrate on increasing the speed of service.

(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)**

26. Just-In-Time (JIT) production systems use cells to place the equipment for minimizing the movement of materials. A cell can be defined as

(a) Grouping of several types of machines in which each machine performs a single operation repeatedly
(b) Grouping of several types of machines in which each machine performs an operation only once
(c) Grouping of several types of machines in which several machines perform a single operation repeatedly
(d) Grouping of several types of machines in which each machine performs a number of similar operations repeatedly
(e) Grouping of several types of machines in which several machines perform a series of similar operations repeatedly. **(1 mark)**

27. Partial productivity is usually adopted by the firms because of the difficulty in measuring total productivity. Which of the following is/are the problem(s) in measuring total productivity?

I. Difficulty in identifying input variables that leads to lower productivity.
II. Inability of expressing all the variables in the same units.
III. Inability to identify all the factors of production in production process.

(a) Only (II) above
(b) Only (III) above
(c) Both (I) and (II) above
(d) Both (II) and (III) above
(e) All (I), (II) and (III) above. **(1 mark)**

28. An organization operating in a competitive environment needs to have competitive advantage over others to attract and retain business. Which of the following statements is/are **true** with regard to gain competitive advantage?

I. Organizations should understand the scope of a particular market.
II. Organizations should identify the various inherent differences between various markets.
III. Organizations should understand the requirement to become qualifiers and order-winners.

(a) Only (II) 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)**

29. Computer Numeric Controlled (CNC) machines are one of the key elements of Computer Aided Manufacturing (CAM). Which of the following statements is/are **true** about CNC?

I. It changes the type of operation to be performed on the process requirements without any human interventions.
II. It stores operational instructions on their on-board computers that control their operations.
III. It assists in the creation, modification, analysis and optimization of a design.

(a) Only (I) above
(b) Only (III) above
(c) Both (I) and (II) above
(d) Both (I) and (III) above
(e) Both (II) and (III) above. **(1 mark)**

30. The philosophy of predictive maintenance is to monitor continuously the vital attributes of the various systems. Which of the following is **not true** in the context of predictive maintenance?

(a) It identifies the problems before they become responsible for breakdowns
(b) It reduces the amount of unscheduled maintenance activities
(c) It minimizes production losses by getting the equipment back into working condition as quickly as possible
(d) It reduces the repair and service time, as much of the diagnostic work is done beforehand
(e) It schedules maintenance activities when the equipment in question is idle and thus, does not interrupt normal production activities. **(1 mark)**

31. Which of the following dimensions of quality, describes a product's primary operating characteristics?

(a) Performance
(b) Features
(c) Reliability
(d) Conformance
(e) Aesthetics. **(1 mark)**

32. Network-based scheduling can significantly improve the execution of a project. Which of following is **not** an advantage of network-based scheduling?

(a) It provides an estimate of the duration of the projects at the given resource level
(b) It is very economical because it requires very less information as input to generate an effective plan
(c) It provides methods for evaluating time-cost trade-offs that result from resource allocation
(d) It provides means for estimating the time and cost impact of changes in the project at the planning stage
(e) It helps in identifying the critical or potentially troublesome activities. **(1 mark)**

33. Which of the following are classified as inputs?

I. Transportation costs.
II. Number of customers served in a restaurant.
III. Knowledge of the workers.
IV. Customer satisfaction.

(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)**

34. One of the associated costs with outsourcing is 'decrease in flexibility'. Which of the following is/are responsible for causing this cost?

I. Control of organization's facilities is passed over to an external agency.
II. A long-term contract is made by the vendor(s) with the client organizations.
III. In long-term, the vendor may replace the skilled personnel with semi-skilled personnel.

(a) Only (II) above
(b) Only (III) above
(c) Both (I) and (II) above
(d) Both (I) and (III) above
(e) Both (II) and (III) above. **(1 mark)**

35. Mr. Vaibhav, the project manager of Maxima solution, found that there were two critical paths of the same project and was unable to decide which critical path should be selected. As per you, how should he select the critical path for the project?

I. He should randomly select the critical path.
II. He should select the critical path, which has the highest variance.
III. He should select the critical path, which has less float.

(a) Only (I) above
(b) Only (II) above
(c) Only (III) above
(d) Both (I) and (III) above
(e) Both (II) and (III) above. **(1 mark)**

36. Just-In-Time (JIT) system aims to achieve a high level of conformance of goods and services with their specifications and reduces waste by eliminating scrap and rework. Which of the following can be stated as the **best** reason that helps JIT firm in maintaining high quality?

(a) It maintains inventory in the smallest possible lot sizes
(b) It encourages to maintain long-term relationships with its suppliers
(c) It maintains uniform loads at workstations
(d) It believes that quality control operates at the source itself
(e) It maintains set up times as low as possible. **(1 mark)**

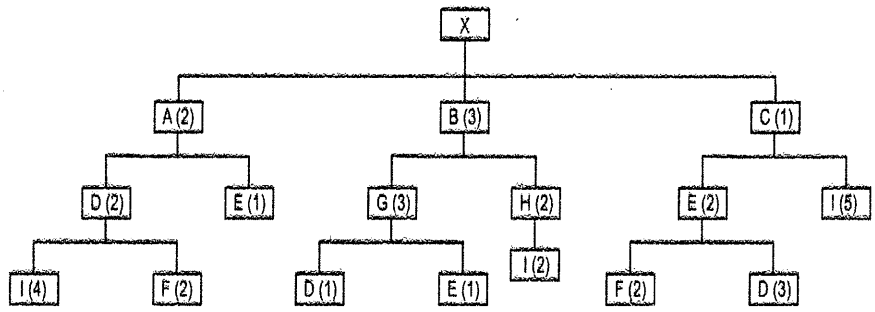
37. Vijaya Textiles Ltd., has five different jobs in process with delivery requirements as shown below.

Jobs	A	B	C	D	E
Planned days	58	61	65	70	67

After the lapse of 51 days, the operations managers of the various jobs states that the time required to complete the jobs A, B, C, D and E are 9, 15, 13, 18 and 16 days respectively. By using the critical-ratio scheduling technique, the sequence of priority of the jobs is

(a) B, A, E, D, C
(b) C, D, A, E, B
(c) B, A, C, D, E
(d) D, E, A, B, C
(e) A, B, D, E, C. **(2 marks)**

38. The Bills of Material for a hypothetical product X are given below.



An inventory of 90 units of subassembly A and 150 units of subassembly B are available on-hand at the time of starting of the production process. If 320 units of X are required, the number of units of I required will be

(a) 2,940 units
(b) 4,290 units
(c) 9,240 units
(d) 9,420 units
(e) 2,490 units. **(2 marks)**

39. From the following information, calculate the average delay of a job (use the dispatching rule – slack time remaining).

Job (In order of arrival)	Processing Time (days)	Due date (Days hence)
A	4	7
B	6	8
C	3	5
D	5	6
E	2	4

(a) 8.4 days
(b) 7.2 days
(c) 6.5 days
(d) 5.8 days
(e) 4.6 days. **(2 marks)**

40. Rahul Engineering manufactures A, B, C and D types of machine tools. Each tool has to undergo through three manufacturing functions: setup work, fabrication and designing. The table given below provides the production rate (no. of units/hr) of each function for each type of product.

Product	Volume	Production Rate (units per hour)		
		Setup work	Fabrication	Designing
A	350	1.5	3.0	5.23
B	400	3.5	5.6	11.00
C	260	4.0	5.0	3.60
D	500	5.0	4.0	5.50

Each employee works for seven hours a day. On the basis of the above information, how many employees are required to complete all the work?

(a) 164
(b) 145
(c) 123
(d) 101
(e) 97. **(2 marks)**

41. Which of the following problems may occur if communication overstates or it understates the functionalities of the system during Enterprise Resource Planning (ERP) implementation?

I. It may force the organization to undergo a brief business process redesign exercise.
II. It would raise employees' expectations unrealistically.
III. It may leave employees unprepared for the changes required for ERP implementation.

(a) Only (III) above
(b) Both (I) and (II) above
(c) Both (I) and (III) above
(d) Both (II) and (III) above
(e) All (I), (II) and (III) above. **(1 mark)**

42. The following benefits accrue to the suppliers from Just-In-Time (JIT) system, **except**

(a) A long-term guaranteed contract for supply of materials
(b) Reduction in production cycle time
(c) A steady and continuous demand for their materials
(d) Less expenditure on promotional activities
(e) Timely payment for materials supplied. **(1 mark)**

43. Facilities management has evolved from being a secondary function to a major function similar to other managerial functions. The manager of which of the following departments used to handle facilities management as a secondary function?

(a) Operations
(b) Finance
(c) Personnel
(d) Sales
(e) Information technology **(1 mark)**

44. 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 provide training?

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)**

45. Countries like India, China, Philippines and Taiwan are preferred by the developed countries for low-labor-cost services such as electronics assembly, textile-making and ITES. Which of the following strategic advantages is/are being explored by the developed countries by adopting this policy?

I. Comparative advantage.
II. Economies of scale.
III. Proprietary product technology.

(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)**

46. When a firm shifts from decentralized purchasing to centralized purchasing route, which of the following benefits may accrue to it?

I. There will be consistency in the firm's buying policies and uniformity in maintaining purchasing records.
II. There will be flexibility in the firm's departmental activities, as the departmental head can change their purchasing preferences according to the requirements.
III. The purchasing power of the firm will increase and it can obtain large purchasing discounts.

(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)**

47. Materials Requirement Planning (MRP) system helps in coordinating orders from external and internal sources. External orders are referred to as

(a) Assemblies
(b) Purchase orders
(c) Jobs
(d) Idle time
(e) Scheduling. **(1 mark)**

48. Which of the following is described as 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?

(a) Flexible Manufacturing Systems
(b) Computer Integrated Manufacturing
(c) Electronic Data Interchange
(d) Computer Aided Manufacturing
(e) Artificial Intelligence. **(1 mark)**

49. Each worker is considered as 'immediate customer' in Just-in-Time (JIT) manufacturing system. Which of the following is/are **not true** relating to the concept of immediate customer?

I. It determines the responsibilities of the workers to ensure the product meets certain specifications and quality requirements.
II. It helps in establishing a separate department for correcting the defects of a worker.
III. It increases employee involvement in correcting and identifying his/her own mistakes.

(a) Only (I) above
(b) Only (II) above
(c) Only (III) above
(d) Both (I) and (III) above
(e) Both (II) and (III) above. **(1 mark)**

50. Which of the following is an example of civil maintenance?

(a) Telephone systems
(b) Material handling equipment
(c) Transport vehicles
(d) Electrical installations
(e) Building construction. **(1 mark)**

51. Which of the following is **not** a benefit of Computer Aided Manufacturing (CAM)?

(a) It provides reliable information inputs
(b) It develops more standardized products design
(c) It ensures consistent product quality
(d) It reduces labor costs
(e) It improves production rate. **(1 mark)**

52. Which of the following is/are the essential element(s) that firms look into its people for the successful implementation of a JIT program?

I. Teamwork.
II. Immediate customer.
III. Supplier involvement.

(a) Only (II) above
(b) Only (III) above
(c) Both (I) and (II) above
(d) Both (I) and (III) above
(e) Both (II) and (III) above. **(1 mark)**

53. Materials Requirement Planning (MRP) system helps in accomplishing the following objectives, **except**

(a) Improved customer service
(b) Less dependency on forecasting
(c) Reduced investment in inventory
(d) Improved operating efficiency
(e) Faster response to market changes. **(1 mark)**

54. Which of the following reasons is/are responsible for high level of work-in-process inventory in the forward scheduling method?

I. In this method, the jobs start at the earliest possible time and complete before they are required at the subsequent work centers.
II. In this method, the jobs are scheduled according to their due dates and as a result, machines remain idle.
III. In this method, the jobs are assigned according to the latest available time slot and as a result, anticipation of demand becomes difficult.

(a) Only (I) above
(b) Only (III) above
(c) Both (I) and (II) above
(d) Both (I) and (III) above
(e) Both (II) and (III) above. **(1 mark)**

55. Which of the following practices is **not** followed in Business Process Reengineering (BPR)?

(a) Complete overhaul of the existing systems and processes in an organization
(b) Customer-focused and responsive to changes in the marketplace
(c) Concentration on knowledge-and-information-based productivity
(d) Rethinking the company's tasks in a holistic and process-oriented manner
(e) Use of downsizing to improve the fundamentals of a company. **(1 mark)**

56. Which of the following sub-functions of materials management deals with obtaining, producing and distributing materials and products at/to the desired place, at the right time?

(a) Traffic
(b) Physical distribution
(c) Logistics
(d) Warehouse
(e) Loading. **(1 mark)**

57. Mr. Krishna Mohan, the materials manager, of Lee & Marc Chocolates, wants to classify the materials into three categories i.e. 'A', 'B' and 'C' as per the information given below.

Type of Materials	Quantity used per year	Cost per unit (Rs.)
M	420	1830
N	2200	650
O	3500	160
P	570	2300
Q	4000	70
R	565	1760

Materials that can be classified under the category 'A' are

(a) N, P, R
(b) P, M, Q
(c) M, R, O
(d) R, O, Q
(e) N, P, M. **(2 marks)**

58. The information related to Amarnath Engineering Ltd., is given in the following table:

Container's capacity	7,100 units
Average demand per unit time	2,200 units
Lead time to produce a part	5 days
Number of Kanbans	3

Calculate the safety stocks to be maintained by the company to meet the demand requirements of the market and the variations.

(a) 10,300 units
(b) 10,900 units
(c) 11,450 units
(d) 11,700 units
(e) 12,100 units. **(2 marks)**

59. The performance of Maxima Plastic Co. in the last quarter is given below.

Sales turnover	Rs.75,00,000
Profit margin	17%(subject to interest and tax deduction)
Cost of land and building	Rs.10,00,000
Cost of machinery	Rs.15,00,000
Cost of materials	Rs. 38,75,000

From the data given, calculate the Return on Investment (ROI) of the company.

(a) 10%
(b) 13%
(c) 16%
(d) 17.5%
(e) 20%. **(2 marks)**

60. Analogous tele, a telecom infrastructure building company, bid for the construction of telephone towers. The activities along with their estimated optimistic (t_o), pessimistic (t_p) and most likely time(t_m) for completion for the project are given below:

Activity	Estimated time(week)		
	t_o	t_m	t_p
1-2	14	17	25
1-3	14	18	21
2-3	13	15	18
2-4	16	19	28
3-6	15	18	27
4-5	13	17	21
5-6	14	18	20

Calculate the total variance of the critical path activities.

(a) 7.53
(b) 8.33
(c) 9.11
(d) 10.14
(e) 12.67. **(2 marks)**

61. Which of the following steps of Enterprise Resource Planning (ERP) implementation provides detailed information about how to carry out transactions and contains only those details that are specific to the business needs of organization where it has been implemented?

(a) Customization
(b) Parallel run
(c) User documentation
(d) Migration to the new system
(e) User training. **(1 mark)**

62. Which of the following is/are **not** advocated by the principles of Supply Chain Management (SCM)?

(a) Lead-time to convert raw material into finished goods should be constant
(b) Every link of supply chain should be involved in collaborative forecasting
(c) Logistics network should be customized as per the specific requirements of customers
(d) Strong and long-term relationships with the suppliers results in cost advantage
(e) Markets should be segmented on the basis of specific needs of customers. **(1 mark)**

63. Maintaining inventory in the smallest possible lot sizes is one of the characteristics of Just-In-Time (JIT) manufacturing system. Which of the following is/are the advantage(s) of maintaining inventory in small lot sizes?

I. They have lower waiting times in the production process.
II. They reduce cycle inventory and cut lead times.
III. They increase setup frequency.

(a) Only (II) above
(b) Only (III) above
(c) Both (I) and (II) above
(d) Both (II) and (III) above
(e) All (I), (II) and (III) above. **(1 mark)**

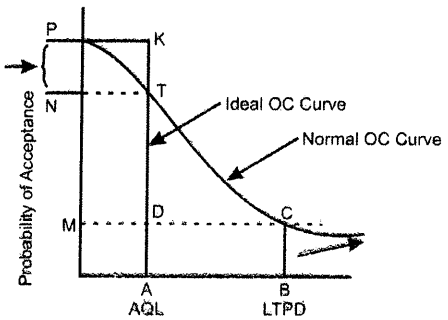
64. Which of the following priority rules gives equal importance to all jobs?

(a) Earliest due date
(b) Longest processing time
(c) Shortest processing time
(d) First in, first serve
(e) Slack time remaining. **(1 mark)**

65. The minimum amount of time in which an activity can be completed is referred to as

(a) Event
(b) Pessimistic time
(c) Expected time
(d) Optimistic time
(e) Slack time. **(1 mark)**

66. The following diagram represents operating characteristics curve of an organization.



In the above diagram consumer's risk arises

(a) In area ABCD
(b) After the point B
(c) Between the points A and B
(d) Between the points M and N
(e) Between the points N and P. **(1 mark)**

67. Which of the following should be focused by a firm, which is involved in mass production of a product or a service?

I. It should synchronize customer demand with the production activities.
II. It should design equipment for broad range of applications.
III. It should avoid delay in the flow of materials.

(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)**

68. The component(s) that make up a typical Flexible Manufacturing System (FMS) is/are

I. An automated loading system to load materials.
II. A system to move materials in between machining centers.
III. A central computer that integrates the whole process.

(a) Only (I) above
(b) Only (II) above
(c) Both (I) and (II) above
(d) Both (II) and (III) above
(e) All (I), (II) and (III) above. **(1 mark)**

69. Building effective partnerships depends on four elements, linearity of production being one amongst them. Which of the following is the characteristic of linearity of production?

(a) A buyer-quality engineer team enables JIT firms to monitor suppliers' activities
(b) A schedule is developed by suppliers to meet the requirements of JIT firm
(c) A sense of confidence is generated amongst suppliers by JIT firms by making timely payments
(d) A mechanism is developed by suppliers that inform JIT firms about the new program, which will improve quality
(e) A schedule is developed by JIT firms, which provides enough time to suppliers to respond to changes in demand. **(1 mark)**

70. Which of the following help(s) a firm in gaining technical efficiency?

I. Increase in the volume or size of the operations.
II. Modification of the existing production processes.
III. Introduction of the automation in production process.

(a) Only (I) above
(b) Only (III) above
(c) Both (I) and (II) above
(d) Both (I) and (III) above
(e) Both (II) and (III) above. **(1 mark)**

71. Which of the following functions of facilities management department deals with activities like site selection, acquisition, building purchase, lease, and disposal?

(a) Real estate management
(b) Construction and project management
(c) Operations, maintenance and repair
(d) Budgeting and accounting
(e) Space planning and management. **(1 mark)**

72. Which of the following components of Supply Chain Management (SCM) deals with the effectiveness of directing the flow of products from suppliers to the company?

(a) Order-to-delivery process
(b) Quality and performance management
(c) Business relationship management
(d) Operational planning
(e) Human resources management. **(1 mark)**

73. Which of the following operational issues of globalization relate to decisions concerned with the flow of materials from one facility to another or from one location to another, the cost of transportation, and the availability of distribution channel?

(a) Capacity
(b) Facilities
(c) Integration
(d) Procedures and planning
(e) Management and organization. **(1 mark)**

74. If a company gives its employees an option of selecting their work hours from a list of available shift, then the personnel-related scheduling approach of the company is referred to as

(a) Part time
(b) Flextime
(c) Flextour
(d) Staggered times
(e) Compressed workweek. **(1 mark)**

75. Which of the following forms of the cell makes the production process more flexible?

(a) Straight Line
(b) L-form
(c) Serpentine form
(d) U-form
(e) T-form. **(1 mark)**

76. Materials Requirement Planning (MRP) system translates the demand for end products into raw material and component requirements. Which of the following are the factors that constitute the part of information, which help MRP system to operate successfully?

I. Inventories at the beginning.
II. Customer orders pending.
III. Independent demand inventories.
IV. Quantities of contracted inventory.

(a) Both (I) and (II) above
(b) Both (I) and (IV) above
(c) Both (II) and (III) above
(d) (I), (II) and (III) above
(e) (I), (II) and (IV) above. **(1 mark)**

77. Which of the following is/are the characteristic(s) of the 'useful life stage' of the bathtub curve analysis?

I. The failure rate is constant and to some extent, predictable.
II. The probability of failure is high and decreases rapidly.
III. The external causes lead most of the failure during this stage.

(a) Only (II) above
(b) Only (III) above
(c) Both (I) and (II) above
(d) Both (I) and (III) above
(e) Both (II) and (III) above. **(1 mark)**

78. In Activity-On-Arrow (AOA) convention, sometimes dummy activities are introduced. Which of the following is/are **not true** about dummy activities?

I. They are used only when relationships among all the activities are identified.
II. Their introduction during the development of a project makes the project uneconomical.
III. They show that two activities do not have the same beginning and end nodes.

(a) Only (I) above
(b) Only (II) above
(c) Only (III) above
(d) Both (I) and (II) above
(e) Both (I) and (III) above. **(1 mark)**

79. Which of the following statements is **not** an advantage of automation?

(a) Improvement in productivity
(b) Efficient use of materials
(c) Improvement in quality of the product
(d) Requirement of technical manpower
(e) Reduction in factory lead-time. **(1 mark)**

80. The philosophy of Total Quality Management (TQM) emphasize upon systematic improvement and maintaining quality standards in an organization. Which of the following is **true** relating to systematic improvement?

(a) It identifies and manages the relationship between various processes
(b) It concentrates on single product or processes
(c) It takes remedial measures for maximum customer satisfaction
(d) It makes the quality personnel responsible for quality improvement
(e) It says that any quality related issues should be dealt by manufacturing department only. **(1 mark)**

81. Program Evaluation and Review Technique (PERT) offers a project manager many benefits in planning for projects. Which of the following is **not** a benefit of this technique?

(a) It establishes relationships among the various project activities
(b) It helps in tactical level planning and operational level control of projects
(c) It develops projects even when the precedence relationships of project activities change
(d) It is effective in planning single project activities in any type of industry
(e) It allows project managers to do 'what if' analysis on project activities. **(1 mark)**

82. Which of the following actions enhance(s) equipment maintenance in JIT manufacturing systems?

I. Organizations should design their equipment as simply as possible, reduce the variety of machines, and standardize replacement parts.
II. Organizations should collect information about the frequency and the causes of equipment failure and use this knowledge to allocate maintenance resources efficiently.
III. Organizations should rebuild equipment by replacing worn-parts one by one, rather than all at once.

(a) Only (I) above
(b) Only (II) above
(c) Only (III) above
(d) Both (I) and (II) above
(e) All (I), (II) and (III) above. **(1 mark)**

83. Which of the following points should be given consideration while selecting an Enterprise Resource Planning (ERP) package that reduces the customization efforts required?

(a) Global presence
(b) Modularity
(c) Investment in R&D
(d) Target market
(e) Price. **(1 mark)**

84. Which of the following is **not** a basic feature of Just-In-Time (JIT) purchasing method?

(a) In this method, buyers and sellers try to reach to the stage of zero defects
(b) In this method, frequent shipment is discouraged to achieve economies of scale
(c) In this method, stable production schedule helps in ensuring smooth flow of production
(d) In this method, buyers and sellers enter into long-term agreements
(e) In this method, a dedicated transportation system helps in avoiding delivery delays. **(1 mark)**

85. Computer Integrated Manufacturing (CIM) is referred to as a computer application that connects various computerized systems into a single multi-functional system. Which of the following is **not true** in the context of CIM?

(a) It takes product design details from a Computer Aided Manufacturing (CAM) system
(b) It lacks in standardized interfaces between the various CIM components
(c) It varies from organization to organization depending on their functional requirements
(d) It combines database systems, manufacturing equipment and sub-systems together into a single integrated system
(e) It represents the highest level of integration in manufacturing. **(1 mark)**

86. The following table provides information regarding the time required to complete a project:

Activity	1-2	1-3	1-4	2-6	3-5	4-5	4-8	5-7	6-7	7-8
Duration (Days)	3	2	6	4	2	1	4	3	2	4

By using the given information determine the critical path of the project and calculate the activity with maximum float.

(a) 1-2-6-7-8 and 3-5
(b) 1-4-5-7-8 and 4-8
(c) 1-3-5-7-8 and 2-6
(d) 1-4-8 and 1-2
(e) 1-2-3-5-7-8 and 6-7. **(2 marks)**

87. Which of the following statement is/are **not true** related to demand-chains?

I. Collaboration with channel partners leads to strong position in market.
II. Products originating from manufacture always capture greater market share.
III. The chain from manufacturer to market, always gives better result.

(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)**

88. Queuing analysis involves the study of waiting lines and queuing systems. Which of the following is **true** related to queuing analysis?

(a) It assumes that arrivals come from an infinite population
(b) It considers that waiting space available at the service facility is limited
(c) It does not help in determining the optimum number of service stations required
(d) It considers the effects of long queues on new arrivals
(e) It does not balance the costs of waiting time with the costs of providing additional service facilities. **(1 mark)**

89. The following table provides the information about input and the resultant output of a small firm:

Items	Income/expenses (Rs.000')
Finished units	20,000
Work in process	5,000
Other income	2,500
Labor	2,000
Capital	17,000
Energy	1,500
Other expenses	2,500

Based on the information given above calculate the total productivity of the firm.

(a) 3.50
(b) 2.75
(c) 2.10
(d) 1.20
(e) .50. **(2 marks)**

END OF QUESTION PAPER

Suggested Answers
Operations Management - II (MB2E4-02): October 2010

	ANSWER	REASON
1.	B	In CAD, wire frame model is used to represent the parts in desirable forms.
2.	E	Kevin P Coyne, Stephen J D Hall and Patricia Gorman Clifford defined core competence in The McKinsey Quarterly (1997), as a combination of complementary skills and knowledge bases embedded in a group or team that result in the ability to execute one or more critical processes to a world-class standard.
3.	D	The cost of material is increasing due to scarcity and increasing demand. Hence, statements (I) and (III) are correct. Increase in internal set-up costs influence overall operational costs and does not increase the materials costs. It increases the price of final products but not the cost of materials. Hence, statement (II) is wrong.
4.	B	Statements (I) and (IV) represent the critical path method correctly. Statement (II) is incorrect with respect to the CPM. Forward pass computation is employed to find the total project time. Statement (III) represents the PERT.
5.	A	Alignment ensures that stakeholders and business processes work towards consciously determined and mutually recognized goals and objectives.
6.	E	Detection or appraisal costs are those costs that are associated with evaluating the quality and performance of the products and machines these costs include inward materials inspection, tests and inspection throughout the transformation process, equipment maintenance, etc.
7.	A	All the activities of critical path have zero float and they are very critical. Hence, only these activities are crashed. Hence, statement (I) is true. Statements (II) and (III) are irrelevant here.
8.	D	ESCM ensures that the organizations get timely and accurate forecasts with regard to product or service demand. This allows proper production planning based on actual requirements. Resulting in reduced cycle time for production activities and reduction in stock-out costs. Hence, statement (II) is correct. The extended organization structure provides instant information about the status of inventory levels to the suppliers. As a result, inventory levels are replenished as and when required and it also improves accuracy in order fulfillment. Hence, statement (I) is wrong and statement (III) is true.
9.	D	One of the important tasks performed by production department is to identify production bottlenecks and minimize them to avoid production delays.
10.	B	In fabricate-to-stock industry, items are manufactured directly by machines rather than assembled by parts, and are stored in stock points to meet the anticipated customer demand.
11.	D	Scheduling low capacity may result in incomplete jobs at the specified time, resulting in poor service to customers.
12.	A	In Economic Impediment, global activities become uneconomical for organizations when different national markets demand different product varieties. Also, the difficulties involved in transporting products and accessing established distribution channels impede the process of globalization. Hence from above discussion, we can infer that option (a) is correct.
13.	B	• P-chart is employed to find out the proportion of defective items in a selected sample. • **R-chart** is used to check the process variability. • $\bar{X}$ -chart illustrates the central tendency of the inspected samples. Hence, statement (II) is true.

14. D The selected activity is crashed to the maximum possible extent until one of the conditions given below is satisfied.

I. The activity time is at its minimum possible value. **(correct)**

II. The time reduced is equal to the smallest slack value of the non-critical activities. **(wrong)**

III. The reduced time is equal to the desired project completion time. **(correct)**

Hence, option (d) is **correct.**

15. A The aesthetics value of a product or service is influenced by individual preference. While one group of customers may regard a product as aesthetic, another group may feel it is not tastefully designed. So companies can use this quality dimension to cater to a niche market.

16. C Mean time between failure $= \sum i \times P(i)$

$= (1 \times 0.05) + (2 \times 0.15) + (3 \times 0.15) + (4 \times 0.05) + (5 \times 0.05) + (6 \times 0.10) + (7 \times 0.10)$

$+ (8 \times 0.05) + (9 \times 0.10) + (10 \times 0.05) + (11 \times 0.05) + (12 \times 0.10)$

$= 0.05 + 0.30 + 0.45 + 0.20 + 0.25 + 0.60 + 0.7 + 0.40 + 0.90 + 0.50 + 0.55 + 1.20$

$= 6.10$ months

$$\text{Number of breakdowns per year} = \frac{12}{\text{Mean time between failure}}$$

$$= \frac{12}{\sum i \times P(i)}$$

Number of breakdowns per year = 12 / 6.10 = 1.967

Number of breakdowns per year for 31 identical machines = 1.967 × 31 = 60.98

17. A When the capacity limitation is not critical, the activity of loading aims at minimizing costs by reducing machine idle time, the amount of inventory etc.

18. D Process mapping helps in the identification of the structure of current processes, and does not set any performance standards. Hence, statement (III) is wrong.

It provides information about the time taken to complete a process, the number of decision points, the number of reporting points, flow of information etc. Hence, statements (I) and (II) are correct.

19. D The flow of information affects the performance of other drivers of SCM. With proper information, organizations can predict the quantity to produce, when it is needed and where it is needed. This makes the supply chain more effective and responsive to market demand.

20. B BOM provides information about whether a particular item was produced internally or purchased from external sources, so gives information about make or buy decision. It shows hierarchical levels or phases a product goes through during production, and hence, can not skip sequence. So, statement II is not correct.

21. C Process-focused organizations lay greater emphasis on efficient remedial maintenance. The objective is to reduce production interruptions due to equipment maintenance. They generally possess in-process inventories to cover for the production loss due to breakdowns.

22. C The approaches for managing core competencies differ widely from the approaches that are used for managing capital base or strategic business units.

All other statements are true.

23. B Order releases empower the purchase department to procure a specific quantity of inventory items required within a specific period.

24. A Robots are described in terms of their physical capabilities. The work envelope and grippers (hands of a robot) are the main determinants of the capability of a robot. The 'work envelope' of a robot is the physical movement capability of the robot's arms and hands.

25. C

The key focus of an organization is to find a balance between cost and quality, and customization and availability without compromising on any one of them. Hence, statements (I) and (III) are correct.

Companies usually design their logistics system either to meet the average service requirements of all customers or to satisfy the toughest requirements of a single customer. However, **both these approaches lead to poor resource utilization. Now, organizations are focusing on customization.**

Hence, statement (II) is wrong.

26. A

Firms that produce the same product repeatedly can benefit by following JIT production systems. Since the process of production is repetitive, movement of materials can be minimized by placing the equipment in cells, where a cell is a grouping of several types of machines in which each machine performs a single operation repeatedly.

27. C

It is difficult to measure total productivity due to the difficulty in identifying/understanding the particular input variable(s) that has led to lower productivity. Another problem with total productivity is that all the variables (inputs and outputs) must be expressed in the same units. But it is difficult to add the number of labor hours to the number of units of energy or any other units of an input.

Hence, **option (c) is correct.**

28. E

To gain competitive advantage, organizations should understand the scope of a particular market and identify the various inherent differences between various markets. They need to understand what is required to become qualifiers and order-winners.

29. C

CNC machines store operational instructions on their on-board computers which control their operations. Without human intervention type of operation can be changed automatically to meet process requirements.

CAD assists in the creation, modification, analysis and optimization of a design.

Statement (I) and (II) are correct and statement (III) is false.

30. C

Benefits of predictive maintenance include:

- It identifies the problems before they become responsible for breakdowns
- It reduces the amount of unscheduled maintenance activities
- It reduces the repair and service time, as much of the diagnostic work is done beforehand
- It schedules maintenance activities when the equipment in question is idle and thus, does not interrupt normal production activities.

Remedial maintenance minimizes production losses by getting the equipment back into working condition as quickly as possible.

Hence, option (c) is wrong.

31. A

Performance is a product's primary operating characteristics.

32. B

Network modeling may be very expensive because it requires a lot of information as input to generate an effective plan. Hence, option (b) is wrong.

33. A

Inputs are:

- Transportation costs (in terms of costs)
- Knowledge of the workers (intangible assets)

Outputs are:

- Number of customers served in a restaurant.
- Customer satisfaction (intangible outputs)

34. A

There are four costs associated with outsourcing

- Loss of control: Control of organization's facilities is passed over to an external agency.
- **Decrease in flexibility:** A long-term contract is made by the vendor(s) with the client organizations.
- Decrease in staffing quality: In long term, vendor may replace the skilled personnel with semi-skilled personnel.
- Increase in costs over time.

Hence, statement (II) is correct.

35. B

- When there is more than one critical path to a project, then the one which has the highest variance will be selected as the critical path for the project.
- While identifying the critical path of the network those activities are taken into consideration whose total float value is zero.

36. D

Option (a) helps in achieving zero inventories.

Option (b) helps in preventing supply disruption.

Option (c) helps in minimizing idle time.

Option (e) helps in reducing cycle time.

JIT system aims to achieve a high level of conformance of goods and services with their specifications and reducing waste by eliminating scrap and rework. The JIT system encourages workers to act on their own to ensure the quality of work; thus, quality control operates at the source itself. Whenever a quality problem is identified, the production process is stopped, and it is continued only after the problem is solved. Hence, option (d) is the most appropriate.

37. A

Critical ratio = Planned time remaining / Actual work remaining.

Planned time remaining = Planned days (-) Time elapsed since beginning the work.

Jobs	Planned time remaining	Actual work remaining	Critical Ratio
A	58 – 51 = 7	9	7 / 9 = 0.78
B	61 – 51 = 10	15	10 / 15 = 0.67
C	65 – 51 = 14	13	14 / 13 = 1.08
D	70 – 51 = 19	18	19 / 18 = 1.06
E	67 – 51 = 16	16	16 / 16 = 1

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 B has the lowest critical ratio and hence the highest priority, while job C has the highest critical ratio (ahead of schedule) and thus the lowest priority. Hence, the correct priority order is – **B-A-E-D-C**

38. C

Quantity of X to be produced = 320 units

Quantity of A required to produce 320 units of X = 320 × 2 = 640 units

Available inventory of A = 90 units

Qty. of A to be produced = Qty. required – Available inventory = 640 – 90 = 550 units

$(2 \times 4) = 8$ units of I are required to produce 1 unit of A.

Hence, $(550 \times 8) = 4400$units of I are required to produce 550 units of A.----------(i)

Quantity of B required to produce 320 units of X = 320 × 3 = 960 units

Available inventory of B = 150 units

Qty. of B to be produced = Qty. required – Available inventory = 960 – 150 = 810 units

$(2 \times 2) = 4$ units of I are required to produce 1 unit of B.

Hence, $(810 \times 4) = 3240$ units of I are required to produce 810 units of B.----------(ii)

Quantity of C required to produce 320 units of X = 320 × 1 = 320 units

5 units of I are required to produce 1 unit of C.

Hence, $(320 \times 5) = 1600$ units of I are required to produce 320 units of C.----------(iii)

Total qty. of I required to produce 320 units of X = 4400 + 3240 + 1600 = **9,240** units.

39. D According to the rule of Slack Time Remaining, the jobs with the shortest slack time are dispatched first. Slack Time = Due Date (–) Processing Times.

Slack times for the five jobs are:

A: 7 – 4 = 3

B: 8 – 6 = 2

C: 5 – 3 = 2

D: 6 – 5 = 1

E: 4 – 2 = 2

As the slack times for the jobs B, C and E are same, these jobs are planned based on their processing times i.e., the job with the smallest processing time is planned first.

The average delay of a job

Job sequence	Processing Time	Due date	Time Flow	Delay
D	5	6	0 + 5 = 5	0
E	2	4	5 + 2 = 7	3
C	3	5	7 + 3 = 10	5
B	6	8	10 + 6 = 16	8
A	4	7	16 + 4 = 20	13

The average delay of a job = (0 + 3 + 5 + 8 + 13)/5 = 29/5 = 5.8 days

40. A

Product	Processing times (hrs.)			Total time (hrs.)
	Setup work	Fabrication	Designing	
A	233.33	116.67	66.92	416.92
B	114.29	71.43	36.36	222.08
C	65	52	72.22	189.22
D	100	125	91	316
Total	512.62	365.10	266.50	1144.22

Since, each employee work for seven hours a day, so

$$\text{No of employees required for setup work} = \frac{512.62}{7} = 73.23$$

$$\text{No of employees required for fabrication} = \frac{365.10}{7} = 52.16$$

$$\text{No of employees required for designing} = \frac{266.50}{7} = 38.07$$

No. of employees required to complete all the work = 73.23 + 52.16 + 38.07 = 163.46 ≅ 164

41. C Communication across the organization while implementing ERP should not overstate or understate the functionalities of the system. Overstating the functionalities would raise employees' expectations unrealistically, while understating them may leave employees unprepared for the changes required for ERP implementation.

42. B Suppliers to firms also benefit from JIT systems: Their benefits include:

- A long-term guaranteed contract for supply of materials
- A steady and continuous demand for their materials
- Less expenditure on promotional activities
- Timely payment for materials supplied

Reduction in production cycle time is an operational benefits that accrues to the JIT **firm not suppliers.**

43. C Facilities management has evolved from being a secondary function handled by a manager in the personnel department to a major function similar to other managerial functions.

44. 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.

45. A Organizations generally globalize their operations to take advantage of opportunities provided by other economies or markets or for obtaining resources. That is, organizations establish their units where they can derive maximum comparative advantage. These comparative advantages may be in the form of low labor costs, availability of natural resources, availability of skilled labor, etc.

Hence, answer is option (a).

46. C The benefits will accrue to the firm:

- There will be consistency in firm's buying policies and uniformity in maintaining purchasing records.
- The purchasing power of firms will increase and it can obtain large purchasing discounts.

Hence, statements (I) and (III) are correct.

Decentralized purchasing route provides flexibility in departmental activities, as departmental head can change their purchasing preferences according to the requirements. Hence, statement (II) is wrong.

47. B An MRP system helps in coordinating orders from external and internal sources. External orders are referred to as purchase orders and internal orders are referred to as jobs. Assemblies, idle time and scheduling are related to jobs.

48. C 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.

49. B Each worker in the firm considers the next worker, who continues the production process, as the 'immediate customer'. Each and every worker is made fully responsible for the work they carry out at their workstation and there is no separate department to correct the defects, it increases the involvement of employees also.

50. E

- Telephone systems: electrical maintenance
- Material handling equipment: mechanical maintenance
- Transport vehicles: mechanical maintenance
- Electrical installations: electrical maintenance
- Building construction: **civil maintenance.**

51. B The benefits of CAM are:

- It provides reliable information inputs
- It ensures consistent product quality
- It reduces labor costs
- It improves production rate

CAD develops more standardized products and design documentation. Hence, option (b) is wrong.

52. D JIT manufacturing includes two important components:

- People involvement
- Total quality control

People involvement includes:

- Teamwork
- Discipline
- Supplier involvement

Total quality control includes:

- Concept of immediate customer.

Hence, option (d) is correct.

53. B Materials Requirement Planning (MRP) system helps an organization to achieve the following objectives:

- Improved customer service
- Reduced investment in inventory
- Improved operating efficiency
- Faster response to market changes

The success of an MRP system depends on the accuracy of forecasting, and hence, it does not decrease the dependency on forecasting.

54. A In the forward scheduling method, the jobs start at the earliest possible time, they are completed before they are required at sub sequent work centers. Therefore, the work-in-process inventory level is high in the forward scheduling method.

55. E In the early nineties, it was assumed that the only way to improve the fundamentals of a company was by downsizing. But this narrow view of restructuring was overtaken by BPR, which advocates the complete overhaul of the existing systems and processes in an organization in order to increase productivity, reduce costs and improve business practices. 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 (e) is wrong.

56. C The materials management function can also be referred to as a combination of three sub-functions; traffic, physical distribution and logistics.

Logistics deals with obtaining, producing and distributing materials and products at/to the desired place, at the right time.

57. A

Type of Materials	Quantity used per year	Cost per unit (Rs.)	Usage Value	% of Usage Value	Cumulative Value
N	**2200**	**650**	**1430000**	**26.76**	**26.76**
P	**570**	**2300**	**1311000**	**24.53**	**51.29**
R	**565**	**1760**	**994400**	**18.61**	**69.90**
M	420	1830	768600	14.38	84.28
O	3500	160	560000	10.48	94.76
Q	4000	70	280000	5.24	100
			5344000		

Since, A category items account for 60 to 70 percent of total cost.

Category A – (N, P and R)

58. A $N = \frac{(dL + S)}{C}$, where

N = Number of Kanbans or containers = 3

d = Average demand per unit time = 2,200 units

L = Lead time to produce a part = 5 days

S = Safety stock =?

C = Container size = 7,100 units

$$3 = \frac{(2{,}200 \times 5 + S)}{7{,}100}$$

$S = (3 \times 7{,}100) - (2{,}200 \times 5)$

$= 10{,}300$ units

59. E

$$ROI = \frac{EBIT}{(\text{Fixed Assets} + \text{Current Assets})}$$

EBIT = 75,00,000×0.17 = Rs. 12,75,000

Fixed Assets = Rs.10,00,000+15,00,000

= Rs.25,00,000

Current Assests = Rs.38,75,000

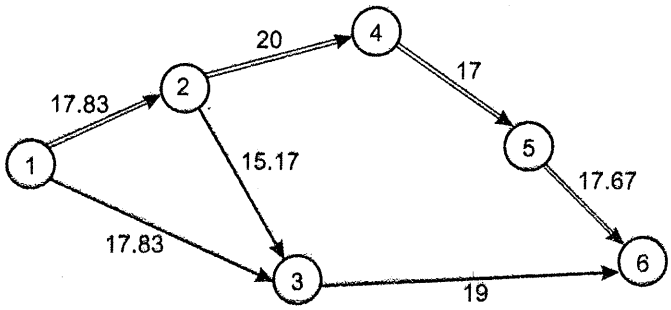
$$= \frac{12,75,000}{(25,00,000 + 38,75,000)}$$

$$= \left[\frac{12,75,000}{63,75,000}\right]$$

= 0.2 or 20 %

60. D

Activity	Time estimates(week)			t_e $\frac{(t_o+4t_m+t_p)}{6}$	Variance $\left\{\frac{(tp-to)}{6}\right\}^2$
	t_o	t_m	t_p		
1-2	**14**	**17**	**25**	**17.83**	**3.36**
1-3	14	18	21	17.83	1.36
2-3	13	15	18	15.17	0.69
2-4	**16**	**19**	**28**	**20**	**4**
3-6	15	18	27	19	4
4-5	**13**	**17**	**21**	**17**	**1.78**
5-6	**14**	**18**	**20**	**17.67**	**1**



Completion Time T_E = sum of all the expected mean times (t_e) on the critical path

= 17.83 + 20 + 17 + 17.67 = 72.5 weeks

σ^2_{cp} = Sum of variance of critical path activities = 10.14

61. C User documentation provides detailed information about how to carry out transactions. The documentation contains only those details that are specific to the business needs of organization where it has been implemented.

62. A Traditionally organizations used to assume that the lead-time to convert raw material into finished goods was constant. But, today this approach is being questioned. Hence option (a) is not true.

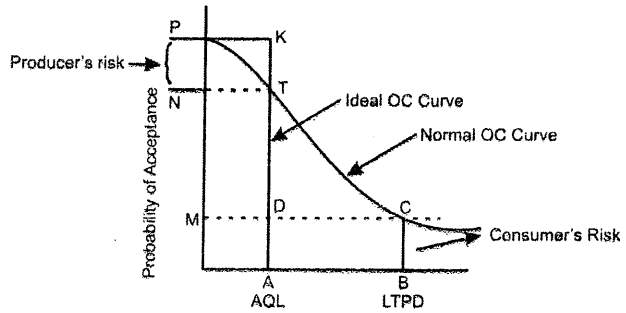
63. C The small lot sizes reduce cycle inventory (the excess of inventory, above the safety stock, that is carried between two orders), cut lead times and also help in achieving a uniform workload. Larger lots have to be kept for a longer time to be processed at the next work center, whereas smaller lots have lower waiting times in the production process. However, the use of small lot sizes is **disadvantageous in terms of increased setup frequency.**

Hence, statements (I) and (II) are advantages of JIT manufacturing system, but statement (III) is a disadvantage.

64. D In 'first in, first serve' rules, jobs are not prioritized according to their relative importance because all jobs are treated as equally important.

65. D Optimistic time is the minimum amount of time in which an activity can be completed.

66. B



A bad lot is defined as a lot with specified percent or more defectives set by the consumers. This is known as Lot Tolerance Percent Defectives (LTPD). Accepting a lot with this percent of defectives is the consumer's risk or Type II error.

In the graph the point B indicates the LTPD. Hence crossing point B indicates the consumer's risk.

67. C The companies involved in mass production of a product or a service have few variations in the production process. in these operations, the labor is trained and the **equipment designed for a narrow range of applications**. The uniformity of processing and the continuity in these operations make it necessary to control the flow of materials and the allocation of labor resources closely, in order to minimize idle time and maximize the flow of inventory. Therefore, scheduling for these operations focuses on **synchronizing customer demand with the production activities of the firm and avoiding delays in the flow of materials.**

Hence, statements (I) and (III) are **correct** but statement (II) is manipulated, therefore it's **wrong.**

68. E All the given options along with an unloading system and machining centers which are automated to change tools are required to make the typical FMS.

69. B Building effective partnerships depends on four elements: trust, communication, linearity of production and time to make changes.

Linear production schedules relate to the development of production schedules with uniform workloads. Since these schedules contribute to the improvement of the firm's manufacturing operations, the supplying firms should tailor their schedules to the JIT firm's need. Hence, option (b) is true.

Option (a) – communication, option (c) – trust, option (d) – communication, and option (e) – time to make changes.

70. E Technical efficiency can be gained by modifying the existing production processes, introducing automation in production processes, etc. Hence, statements (II) and (III) are correct.

The increase in the volume or size of operations helps in achieving scale productivity. Hence, statement (I) is wrong.

71. A Real estate management: Activities like site selection, acquisition, building purchase, lease, and disposal are carried out under this function.

72. A The order-to-delivery process defines how effectively an organization can direct the flow of products from suppliers to the company.

73. C Integration decisions are concerned with the flow of materials from one facility to another or from one location to another, the cost of transportation, and the availability of distribution channel.

74. D In staggered times approach, employees are given an option to select their work hours from a list of available shifts.

75. D U-form cells make the production process more flexible.

76. E Following factors are included in the information, which help MRP system to operate successfully:

- Inventories at the beginning.
- Customer orders pending.
- Quantities of contracted inventory.

Details of the **dependent** demand inventories are required. Hence, statement (III) is wrong.

77. D In adult or useful life stage the failure rate is constant, and to some extent, predictable. Proper maintenance of equipment can ensure the longevity of this stage. Most of the causes of failure during this stage are attributed to external causes or accidents. Hence, statements (I) and (III) are correct.

In the infant mortality or burn in stage, the probability of failure is very high but decreases rapidly. Hence, statement (II) is wrong.

78. D Dummy activities are introduced to establish relationships among all the activities and if relationships are already indentified it should not be used.

They show that two activities don't have same beginning and end nodes and they do not utilize any time or resource.

Statement (III) is correct and statements (I) and (II) are false.

79. D Advantages of automation are improvement in productivity, efficient use of materials, improvement in the quality of the product, improvement in work environment for the workers and reduced factory lead-time.

Requirement of technical manpower is a disadvantage of automation. Hence, option (d) is wrong.

80. A Systematic improvement involves identifying and managing the **relationships between various processes** and systems to achieve organizational objectives. Hence, **option (a) is true.**

TQM makes **everyone responsible** for quality control in the organization, so **all the departments should coordinate** to each other to maintain high level of quality. Hence, **option (d) and (e) are wrong.**

Total productivity management helps in proper maintenance of machinery and other capital equipment and do not prefer remedial maintenance. Hence, **option (c) is wrong.**

TQM as a philosophy involves improvement in every aspect of an organization's functioning, and **is not limited to a single product or process.** Hence, **option (b) is wrong.**

81. C PERT fails when there is a change in the precedence and sequential relationships of project activities. Hence, option (c) is not an advantage of PERT.

Other options are the advantage of PERT.

82. D Important principles and actions that enhance equipment maintenance in JIT manufacturing systems are:

- Organizations should design their equipment as simple as possible, reduce the variety of machines, and standardize replacement parts.
- Organizations should collect information about the frequency and causes of equipment failure and use this knowledge to allocate maintenance resources efficiently.
- Organizations can rebuild equipment by replacing all worn parts at once, rather than replacing them one by one.
- Organizations should carefully plan their purchases so that all parts are available when needed.

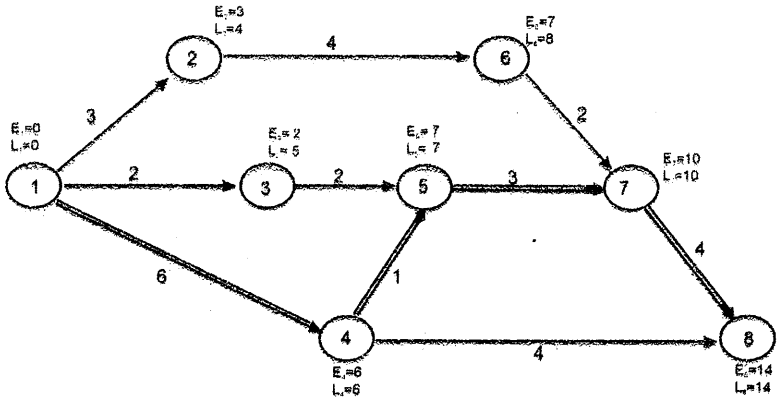
Hence, from above discussion, we can infer that option (d) is correct.

83. 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.

84. B JIT purchasing **encourages** frequent shipment in small lot sizes. It reduces the inventory storing and maintenance costs. Hence, option (b) is wrong.

85. A A typical CIM system takes product design details from a CAD system and other customer order information systems, and uses this information to create purchase orders (for producing necessary materials), work instructions, tooling requirements and so on.

86. B



Critical Path – 1-4-5-7-8

Activity	Duration (D)	Earliest Starting Time (E)	Earliest Finish Time (E+D)	Latest Finish Time (L)	Latest Starting Time (L-D)	Float (L-D)-E
1-2	3	0	3	4	1	1
1-3	2	0	2	5	3	3
1-4	6	0	6	6	0	0
2-6	4	3	7	8	4	1
3-5	2	2	4	7	5	3
4-5	1	6	7	7	6	0
4-8	4	6	10	14	10	**4**
5-7	3	7	10	10	7	0
6-7	2	7	9	10	8	1
7-8	4	10	14	14	10	0

Activity with maximum float – 4-8.

87. D In demand chain, stress is upon collaboration with channel partner, who has strong position in market and can better serve to the end user. In supply chain, stress is upon building partnership from manufacturer to market.

In demand chain, it is believed that any player of supply chain can develop product at any time, hence, it is not necessary that product should be originating from manufacturer only.

Hence, statement (I) is true and (II) and (III) are not true.

88. A One of the limitations of queuing model is: arrivals are assumed to come from an infinite population. Hence, option (a) is correct.

89. D

Items	Income/expenses(Rs.000')
Output	
Finished units	20,000
Work in process	5,000
Other income	2,500
Total	**27,500**
Input	
Labor	2,000
Capital	17,000
Energy	1,500
Other expenses	2,500
Total	**23,000**

$$\text{Total productivity} = \frac{\text{Goods and/or services produced (output)}}{\left[\text{Labor} + \text{capital} + \text{energy} + \text{technology} + \text{materials}\right]\text{(input)}}$$

$$= \frac{27,500}{23,000} = 1.1956 \cong 1.20$$

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