

**MTH601 Operations Research**  
**Final Term Examination - February 2005**  
**Time Allowed: 150 Minutes**

**Instructions**

Please read the following instructions carefully before attempting any of the questions:

1. Attempt all questions. Marks are written adjacent to each question.
2. Do not ask any questions about the contents of this examination from anyone.
  - a. If you think that there is something wrong with any of the questions, attempt it to the best of your understanding.
  - b. If you believe that some essential piece of information is missing, make an appropriate assumption and use it to solve the problem.
  - c. Write all steps, missing steps may lead to deduction of marks.
3. In Q3 you can either draw the network diagram or simply write the asked terms for each activity in the exam software, whichever you think is easy for you. But remember that you have to show your work on exam application correspond to each question.

Total Marks: 50  
Questions: 8

Total

**Question No. 1**

**Marks : 4**

Define the followings.

- (a) Impossible Assignment
- (b) Unbounded Solution.

**Question No. 2**

**Marks : 10**

Consider the problem

$$\text{maximize } z = x_1 + 5x_2 + 3x_3$$

Subject to

$$x_1 + 2x_2 + x_3 = 3$$

$$2x_2 - x_3 =$$

$$x_1, x_2, x_3 \geq 0$$

The variable  $X_3$  plays the role of a slack. Use *big M-method* to solve the problem.

**Question No. 3**

**Marks : 4**

How the problem of the degeneracy arises in a transportation problem?

**Question No. 4**

**Marks : 4**

Define the followings in Queuing Theory.

- a. Customer
- b. Server
- c. Priority

**Question No. 5**

**Marks : 4**

What are the variants of the simplex method? Write few lines about the followings.

- (a) Unbounded solution.
- (b) Unrestricted variables.

**Question No. 6**

**Marks : 10**

Five different machines can process any of the five required jobs with different profits resulting from each assignment.

Find the maximum profit possible through optimum assignments.

**Question No. 7**

**Marks : 4**

How can the linear programming be applied to management problem?

Consider the transportation problem having the following parameter table.

Use the northwest corner rule to obtain an initial basic feasible solution.

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## MTH601 Operations Research

Final Term Examination – Spring 2005

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  - b. If you believe that some essential piece of information is missing, make an appropriate assumption and use it to solve the problem.
  - c. Write all steps, missing steps may lead to deduction of marks.
3. The duration of this examination is **150 minutes**.
4. This examination is closed book, closed notes and closed calculator.
5. Calculator is allowed.
6. Symbols by using math type should be pasted on the paper direct from the math type not from the word document otherwise it would not be visible.
7. In order to get full marks do all necessary steps.

**\*\*WARNING: Please note that Virtual University takes serious note of unfair means. Anyone found involved in cheating will get an 'F' grade in this course.**

Total Marks: 50

Total Questions: 17

Question No. 1

Marks : 01

- 
- 
- None of the above

**Question No. 2**

**Marks : 01**

According to \_\_\_\_\_ strategy, replace an item if it fails before the optimal life

- IR
- IPR
- CPR (Common Preventive Replacement)

**Question No. 3**

**Marks : 03**

**Question No. 4**

**Marks : 05**

**Question No. 5**

**Marks : 01**

In purchasing model with shortage, the formula of Ordering Size is

- [Redacted]
- [Redacted]
- [Redacted]
- [Redacted]

**Question No. 6**

**Marks : 01**

Similarity between CPM and PERT is

- Both are used to plan the scheduling of individual activities that make up project
- Both can be used to determine the earliest/latest start and finish time for activity
- All of the above

**Question No. 7**

**Marks : 05**

The arrival rate of customers at a banking counter follows Poisson distribution with a mean of 45 customers per hour. The service rate of the counter clerk also follows Poisson distribution with a mean of 60 customers per hour.

Find the following

1. The probability of having 10 customers in the system
2. Average number of customers waiting in the system
3. Average number of customers waiting in the queue
4. Average waiting time of customers in the system
5. Average waiting time of customers in the queue

**Question No. 8**

**Marks : 01**

The formula for expected number of customers in a system is

- $L = \lambda / (\mu - \lambda)$
- $L = \lambda / (\lambda - \mu)$
- $L = \mu / (\lambda - \mu)$
- $L = \mu / (\mu - \lambda)$

**Question No. 9**

**Marks : 01**

For LP problem with 'n' decision variables, each of its corner point solution is at intersection of \_\_\_\_\_ the \_\_\_\_\_ constraint boundaries.

- (n - 1) constraint
- 'n' constraints
- (n + 1) constraint
- None of these

**Question No. 10**

**Marks : 01**

In two dimensional LP problem we need only two lines to identify an extreme point. If any two dimensional problem there are three or more intersecting lines at the corner point this indicate that

- Problem has Degenerate Solution
- One of the constraints is Redundant
- Both First and Second
- None of the above

**Question No. 11**

**Marks : 10**

**Question No. 12**

**Marks : 01**

A transportation problem is degenerate, if while deriving a feasible solution an allocation

- Satisfies the Column
- Satisfies the Row
- Satisfies both column as well as row requirements
- None of the above

**Question No. 12**

**Marks : 01**

- Problem has Multiple Optimal
- Problem has Unbounded
- Problem has Infeasible Solutions
- None of the above

**Question No. 12**

**Marks : 07**

Question No. 12

Marks : 05

Question No. 12

Marks : 01

- Dividing the Big-M method's objective function by 'M' and then dropping the negligible terms
- Dividing the Big-M method's objective function by '-M' and then dropping the negligible terms
- Multiply the Big-M method's objective function by 'M' and then dropping the negligible terms
- Multiply the Big-M method's objective function by '-M' and then dropping the negligible terms

Question No. 12

Marks : 05

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Final Term Examination - February 2005

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$$\text{maximize } z = x_1 + 5x_2 + 3x_3$$

Subject to

$$\begin{aligned}
 x_1 + 2x_2 + x_3 &= 3 \\
 2x_1 - x_2 &= 4 \\
 x_1, x_2, x_3 &\geq 0
 \end{aligned}$$

The variable  $x_3$  plays the role of a slack. Use *big M-method* to solve the problem.

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**Marks : 10**

Consider the transportation problem having the following parameter table.

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# Mth601

## Quize no #1

### Solved by eyesha jannat

Q1: In a development project, if an activity (i,j) of six days duration, starts late on 3rd day then which of the following will be its latest finish time?

Select correct option:

9th day

2nd day

3rd day

18th

2-Which of the following value is correct for the expected time of an activity having optimistic, pessimistic and most likely times as 4, 8 and 6 days respectively?

Select correct option:

6.66 days

9.33 days

6 days

4.66 days

In the relation of finding the expected time of an activity, most likely time is weighted more than the other optimistic and pessimistic times and these exist in the ratio of -----.

Select correct option:

6:1

2:1

4:1

3:1

4- While finding the Critical Path, in the phase of Late Start and Late Finish, we start from last node and the computations are performed from ----- up to the beginning event.

Select correct option:

right to left

left to right

top to bottom

bottom to top

5-In a Project Management, if the Critical activities of a network are delayed then -----.

Select correct option:

project finish time will have to extend

project cost will increase

more resources have to employed

[All above choices are equivalent](#)

6- In PERT, the possible variation in activity times can be measured from ----- of the corresponding Beta Distribution.

Select correct option:

Variance

Mean

Expected Time

[Standard Deviation](#)

7- In Project Management, Critical Path method is based on ----- times.

Select correct option:

deterministic

[probabilistic](#)

stochastic

serial

8- While identifying the Critical Path of a network flow diagram, the Late Start and Late Finish phase confirms that project start time is -----.

Select correct option:

serial

zero

infinity

arbitrary

9- The network flow diagrams for PERT and CPM are same except for -----.

Select correct option:

dummy activities

**critical Path**

initial and final events

activity times

10- Which of the following Probabilistic time in PERT has the same analogical meaning of Deterministic time (time to complete any activity) in CPM?

Select correct option:

Expected

**Optimistic**

Pessimistic

Most Likely

11- Which of the following is the objective of Project Management by using PERT and CPM methods, for any project subject to resource constraints?

Select correct option:

To minimize the project time

To maximize the total project profit

To minimize the total project cost

To minimize the resource constraints

12- The task which is executed by the usage of resources and time is called -----.

Select correct option:

node

event

project

activity

13- In a network flow diagram, two jobs (i,j) and (i,k) of '9' and '6' days duration leaves the node 'i' then which of the following will be Late start time for 'i', if it is provided that both (i,j) and (i,k) finish late on 12th and 8th day respectively?

Select correct option:

6th day

2nd day

3rd day

1st day

14- About which of the following it is true that, "they only signify with the passage of time, the beginning and ending of some activities under no consumption of resources" ?

Select correct option:

project

nodes

dummy

branch

15- A Critical Path in a network flow diagram -----.

Select correct option:

is unique

may at most two

depends on number of dummies

may be multiple

16-In a development project, if an activity (i,j) of six days duration, starts late on 3rd day then which of the following will be its latest finish time?

Select correct option:

9th day

2nd day

3rd day

18th day

17- while solving a network flow problem by PERT, which of the following type of time will be used to measure the length of Critical Path?

Select correct option:

Pessimistic

Expected

Most Likely

Optimistic

18- For any activity (i,j), if , a) Earliest start time of 'i' = Latest finish time of 'i', b) Earliest start time of 'j' = Latest finish time of 'j', c) difference of Earliest start times of events 'i' and 'j' = difference of Latest finish times of events 'i' and 'j' = time to complete the job, then the activity (i,j) is said to be -----.

Select correct option:

dummy

critical

non-Critical

non of the above

19- In a project, a network diagram shows the precedence relations of inter related activities along with their corresponding activity -----.

Select correct option:

times

cost

profit

quantity

20-The network flow diagrams for PERT and CPM are same except for -----.

Select correct option:

dummy activities

critical Path

initial and final events

activity times

20-Which of the following relation is true among the probabilistic times in PERT?

Select correct option:

Most Likely < Optimistic < Pessimistic

Optimistic < Most Likely < Pessimistic

Most Likely < Pessimistic < Optimistic

Pessimistic < Most Likely < Optimistic

21-In the phase of Early Start and Early Finish, to find the Critical Path in a network flow diagram, the computations are proceeded from ----- to the final event.

Select correct option:

bottom to top

right to left

left to right

top to bottom

22- Which of the following relation is correct for the Standard Deviation of an activity times having optimistic, pessimistic and most likely values as 4, 8 and 6 days respectively?

Select correct option:

0.666

01

0.147

7.111

23- In a project, a network diagram shows the ----- relations of the inter related activities along with their corresponding activity times.

Select correct option:

deterministic and probabilistic

precedence or succession

union and intersection

dummy and artificial

24- In a network flow diagram, for an activity (i,j) of six days duration, if its Late Finish time is of nine days, then which of the following will be its Late Start time?

Select correct option:

Twelve days

Fifteen days

Three days

Six days

25- In PERT, the possible variation in activity times is measured from Standard Deviation which is -----of the difference between Pessimistic and Optimistic times.

Select correct option:

one sixth

one fourth

one third

one fifth

26- In a network flow diagram, which of the following method through computations provides, i) start and completion times for each activity, ii) critical and non critical activities and iii) total and free slacks?

Select correct option:

Resource Scheduling

Resource Allocation

PERT

CPM

27- In the phase of Early Start and Early Finish, to find the Critical Path in a network flow diagram, for the first node(event), we start with time -----.

Select correct option:

t = infinity

t = 0

t = a (arbitrary)

with strict positive value

28- If an activity has non-zero value of total float such that it can be further delayed to the length of slack without delaying the project, then it is said to be -----

Select correct option:

dummy

critical

non-Critical

non of the above

29- In a network flow diagram, if two jobs 'a(l,n)' and 'b(m,n)' of '7' and '8' days durations respectively, start earlier simultaneously on 4th day, then the next activity containing 'n' as head event can't start until the entering activity ----- is completed.

Select correct option:

(m,n)

(l,n)

(m,l)

(l,m)

Question # 1 of 10 ( Start time: 06:02:36 PM ) Total Marks: 1

Which of the following value is correct for the Variance of an activity times having optimistic, pessimistic and most likely values as 4, 8 and 6 days respectively?

Select correct option:

01

0.147

2.666

**0.444**

Question # 2 of 10 ( Start time: 06:04:06 PM ) Total Marks: 1

The task which is executed by the usage of resources and time is called -----.

Select correct option:

node

event

**project**

activity

Question # 3 of 10 ( Start time: 06:05:37 PM ) Total Marks: 1

In a development project, if an activity (i,j) of six days duration, starts late on 3rd day then which of the following will be its latest finish time?

Select correct option:

**9th day**

2nd day

3rd day

18th day

Question # 4 of 10 ( Start time: 06:07:06 PM ) Total Marks: 1

For any activity (i,j), if , a) Earliest start time of 'i' = Latest finish time of 'i', b) Earliest start time of 'j' = Latest finish time of 'j', c) difference of Earliest start times of events 'i' and 'j' = difference of Latest finish times of events 'i' and 'j' = time to complete the job, then the activity (i,j) is said to be -----.

Select correct option:

**dummy**

**critical**

non-Critical

non of the above

Question # 5 of 10 ( Start time: 06:08:32 PM ) Total Marks: 1

If both jobs 'a(l,n)' and 'b(m,n)' of '7' and '8' days durations respectively, start earlier simultaneously on 4th day, then 'n' can start earlier on -----day.

Select correct option:

8th

**11th**

15th

12th

Question # 6 of 10 ( Start time: 06:10:03 PM ) Total Marks: 1

In a network flow diagram, if an event is the predecessor of three other events then how many dummies are inevitable to include in the network?

Select correct option:

One

**Two**

Four

Three

Question # 7 of 10 ( Start time: 06:10:57 PM ) Total Marks: 1

Which of the following times are not directly related to the activity cost as there is no certainty of time in such activities so their duration cannot be reduced, hence the cost cannot be expressed correctly?

Select correct option:

**CPM Times**

PERT Times

Question # 8 of 10 ( Start time: 06:12:21 PM ) Total Marks: 1

Which of the following relation is true among the probabilistic times in PERT?

Select correct option:

Most Likely < Optimistic < Pessimistic

**Optimistic < Most Likely < Pessimistic**

**Most Likely < Pessimistic < Optimistic**

Pessimistic < Most Likely < Optimistic

Question # 9 of 10 ( Start time: 06:13:49 PM ) Total Marks: 1

Which of the following technique to solve the net work flow diagrams, is activity oriented?

Select correct option:

**Programme Evaluation and Review Technique**

Critical Path Method

Question # 10 of 10 ( Start time: 06:15:19 PM ) Total Marks: 1

In a network flow diagram, two jobs (i,j) and (i,k) of '9' and '6' days duration leaves the node 'i' then which of the following will be Late start time for 'i', if it is provided that both (i,j) and (i,k) finish late on 12th and 8th day respectively?

Select correct option:

**6th day**

2nd day

3rd day

1st day

1. \_\_\_\_\_ employs a different modeling and solution logic than linear programming
  - (a). Transportation Model
  - (b). Inventory Control Model
  - (c). Dynamic Programming**
  - (d). None of the above
  
2. To identify and maintain the proper precedence relationship between activities those are not connected by event, we introduce
  - (a). Parallel Activity
  - (b). Dummy Activity**
  - (c). Sequential Activity
  - (d). None of the above
  
3. EST and EFT of activities are calculated in
  - (a). Forward pass**
  - (b). Backward pass
  
4. Critical path is obtained by connecting the jobs having
  - (a). Activities having same EST and LST
  - (b). Activities having same EFT and LFT
  - (c). Activities having zero slack
  - (d). All of the above**
  
5. The Variance  $V_t$  of expected time is calculated as
  - (a).  $V_t = \left(\frac{t_m - t_o}{6}\right)^2$
  - (b).  $V_t = \left(\frac{t_o - t_p}{6}\right)^2$**
  - (c).  $V_t = \left(\frac{t_p - t_m}{6}\right)^2$
  - (d). None of the above
  
6. In LP problems Additivity means that
  - (a). The effect of two different programs of production is the same as that of a joint program**
  - (b). The doubling (or tripling) the product will exactly double (or triple) the profit and the required resource
  - (c). Both (a)& (b)
  - (d). None of the above
  
7. Two of the first steps of OR process encompass the actual use of OR techniques. These steps are
  - (a). Model Construction and Model Solution**
  - (b). Observation and Implementation
  - (c). Definition of the problem and Model Solution

(d). Model Solution and Implementation of results

8. Let FS = Free Slack, TS = Total Slack, INDS = Independent Slack, then which relation is true

- (a).  $TS \leq FS$
- (b).  $INDS \leq FS$
- (c).  $FS \leq TS$
- (d). Both (b) & (c)**

9. Best possible time estimate that a given activity would take under normal conditions which often exist, is called

- (a). Most Likely time estimate**
- (b). Pessimistic time estimate
- (c). Smallest time estimate
- (d). None of the above

10. Standard Deviation S.D is

- (a). One sixth of the difference between pessimistic time estimates and optimistic time estimates**
- (b). One sixth of the difference between pessimistic time estimates and most likely time estimates
- (c). One sixth of the difference between optimistic time estimates and most likely time estimates
- (d). One sixth of the difference between most likely time estimates and optimistic time estimates

Which one is best describe Sectoral planning

- ? **Inventory Planning in agriculture**
- ? Improving the layout of a workshop in a company
- ? Simulation Modeling of the Economy of the country
- ? None of these.

\_\_\_\_\_ is the most appropriate to situations where we maintain a relative stable employment levels and utilize the resource at a more constant rate

- ? (a). Resource Leveling Program
- ? (b). Resource Allocation Program
- ? (c). Both a & b
- ? (d). None of these.

If the slack time is zero, it means that the project will be

- ? Delayed
- ? Completed on schedule

The amount of an activity can be delayed without affecting the early start time of any other job, is called

- ? Free Slack
- ? Independent Slack
- ? Total Slack
- ? None of these.

**Question No: 1 ( Marks: 1 ) - Please choose one**

---

EST and EFT of activities are calculated in

- ▶ Forward pass
- ▶ Backward pass
- ▶ Path does not effected

**Question No: 2 ( Marks: 1 ) - Please choose one**

---

\_\_\_\_\_ may be less than most likely time estimate

▶ **Pessimistic time estimate**

▶ Smallest time estimate

▶ Optimistic Time estimate

**Question No: 3 ( Marks: 1 ) - Please choose one**

---

The dummy activities consume

▶ **No time, no resources**

▶ No time but some resources

▶ Some resources in minimum time

▶ None of these

**Question No: 4 ( Marks: 1 ) - Please choose one**

---

If an activity consumes no time and no resources then this activity is called \_\_\_\_\_.

▶ **dummy activity**

▶ sequential activity

▶ critical activity

▶ cyclic activity

**Question No: 5 ( Marks: 1 ) - Please choose one**

---

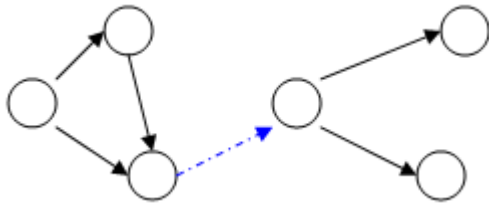
Cost period = -----  $\times$  ( No of ordered items)

- ▶ Holding cost
- ▶ Set up cost
- ▶ Stock out cost
- ▶ **Item cost**

**Question No: 6 ( Marks: 1 ) - Please choose one**

---

The following network is an example of

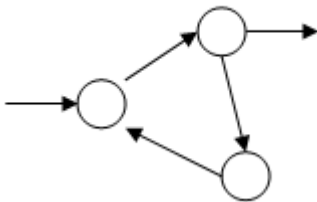


- ▶ Redundancy
- ▶ Cycling
- ▶ Looping
- ▶ **Merging**

**Question No: 7 ( Marks: 1 ) - Please choose one**

---

The following network is an example of



- ▶ **Redundancy**

- ▶ Dangling
- ▶ Cycling
- ▶ Dummy

**Question No: 8 ( Marks: 1 ) - Please choose one**

---

Which one is best describe Micro Economic Planning?

- ▶ Distribution of fertilizer
- ▶ **Improving the layout of a workshop in a company**
- ▶ Investment planning of the country
- ▶ PERT

**Question No: 9 ( Marks: 1 ) - Please choose one**

---

If  $t_0 = 6$ ,  $t_m = 12$  and  $t_p = 18$ , then  $V_I =$  \_\_\_\_\_

- ▶ 12
- ▶ 2
- ▶ **4**
- ▶ 144

**Question No: 10 ( Marks: 1 ) - Please choose one**

---

Which inventory model also known as a saw tooth model?

- ▶ **Purchasing Model with no shortages**
- ▶ Purchasing Model with shortages
- ▶ Manufacturing Model with no shortages
- ▶ Manufacturing Model with shortages

**Question No: 11 ( Marks: 1 ) - Please choose one**

---

For backward pass computations

- ▶ Earliest start time  $\geq$  Latest start time
- ▶ Earliest start time  $\leq$  Latest start time
- ▶ Earliest start time  $+$  Latest start time = 0
- ▶ Earliest start time  $=$  Latest start time

**Question No: 12 ( Marks: 1 ) - Please choose one**

---

For an activity if optimistic time, most likely time estimate and pessimistic time estimate are **3**, **6** and **15** respectively then expected time is

- ▶ 4
- ▶ 3
- ▶ **7**
- ▶ 20

**Question No: 13 ( Marks: 1 ) - Please choose one**

---

In a quadratic programming problem unlike linear programming problem

- ▶ Only objective function is quadratic
- ▶ Both objective function and constraints are quadratic
- ▶ Only constraints are quadratic
- ▶ At least one of objective function or constraint must be quadratic

**Question No: 14 ( Marks: 1 ) - Please choose one**

---

Solution region of the constraint  $x \geq 0$  is

- ▶ Half plane to the right of straight line  $x = 0$
- ▶ Half plane to the right of y-axis
- ▶ Half plane to the region where abscissas are non-negative
- ▶ All are equivalent

**Question No: 15 ( Marks: 1 ) - Please choose one**

---

A dummy activity is a simulated activity of sorts, one that is of \_\_\_\_\_duration and is created for the sole purpose of demonstrating a specific relationship and path of action on the arrow diagramming method.

- ▶ Zero
- ▶ Minimum
- ▶ Maximum
- ▶ Average

**Question No: 16 ( Marks: 1 ) - Please choose one**

---

Activity definition refers to the process of parsing a project into a number of individual tasks which must be completed \_\_\_\_\_ the deliverables can be considered completed. Activity definitions rely on a number of specific input processes.

- ▶ **before**
- ▶ both before and after
- ▶ after

**Question No: 17 ( Marks: 1 ) - Please choose one**

---

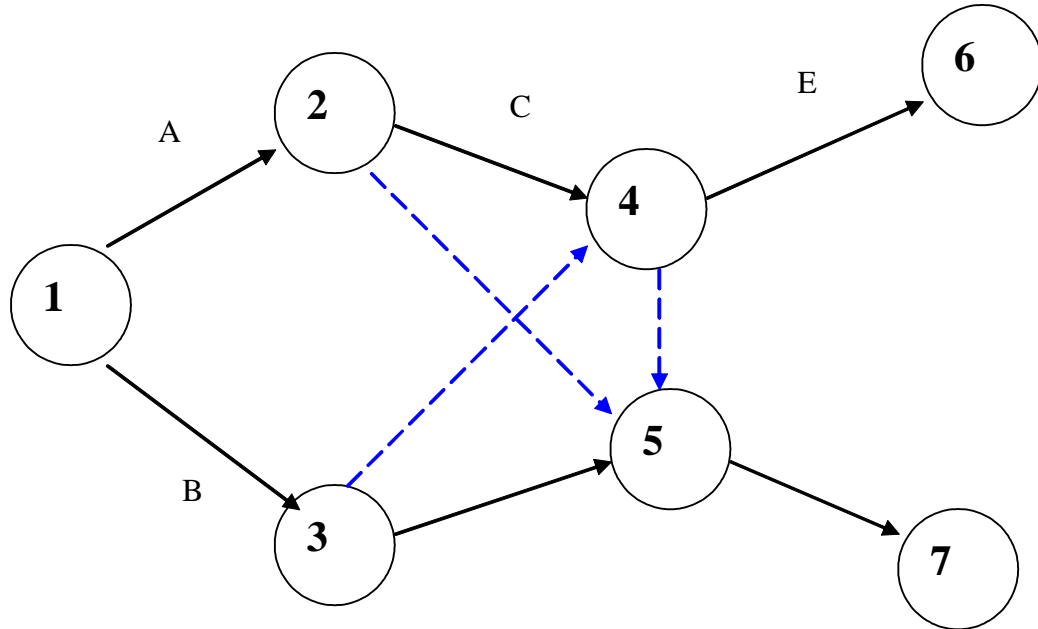
A forward pass is used to determine and calculate the \_\_\_\_\_ dates, through utilization of a previously specified start date.

- ▶ **early start and early finish**
- ▶ late start and early finish
- ▶ early start and late finish
- ▶ late start and late finish

**Question No: 18 ( Marks: 1 ) - Please choose one**

---

Is this Network legal?



► Yes.

► **No.**

**Question No: 19 ( Marks: 1 ) - Please choose one**

---

Total cost per period = Item cost + Order cost + Holding cost + \_\_\_\_\_.

► **Shortage cost**

► Optimum Shortage (S\*)

► Economic Order Quantity. (Q\*)

► Maximum Inventory. (I<sub>max.</sub>)

**Question No: 20 ( Marks: 1 ) - Please choose one**

---

$$K = Z \times (\text{---})$$

Where K is called service factor.

▶  $\sqrt{\pi/2}$

▶  $\sqrt{2/\pi}$

▶  $\sqrt{2\pi/3}$

▶  $\sqrt{3\pi/2}$

- 
1. The first step in a problem solving exercises in OR is the \_\_\_\_\_ that exist in the system.

Construction of the model of problem

Identification of the problem

Solution of the problem

None of these

- 2 .A requirement for the definition of the problem in OR is that \_\_\_\_\_ must be clearly defined which helps to focus attention on what the problem is

Method

**Objective**

Solution

None of these

- 3 . In a network flow diagram, time follows from \_\_\_\_\_

**Left to right**

Right to left

Any direction

4. The dummy activities consume

**No time, no resources**

No time but some resources

Some resources in minimum time

All resources in a given time

5. In a national highway system intersection of two or more roads has the same analogy as the \_\_\_\_\_ in the network flow diagram.

Branch

Critical activity

Flow

**Node**

6. Best possible time estimate that a given activity would take under normal conditions which often exist, is called

**Most likely time estimate**

Pessimistic time estimate

Smallest time estimate

Activity time estimate

7. In \_\_\_\_\_, activity time estimates are distributed according to beta distribution

**PERT**

CPM

Project Network

Float

8. If we have 2,4 and 12 hours as the optimistic( $t_0$ ) most likely ( $t_m$ ) and pessimistic( $t_p$ ) then the expected time for the activity would be

7

6

**5**

4

9. If  $t_0=2$   $t_m=5$  and  $t_p=14$  then  $SD=$ \_\_\_\_\_

**2**

4

6

8

10. IF  $t_0=6$ , $t_m=12$  and  $t_p=18$  then  $V_t=$ \_\_\_\_\_

12

2

**4**

144

11. The graphical method for solving a linear programming problem is applicable when

\_\_\_\_\_

**Two variables are involved**

Three variables are involved

Any number of variables are involved

None of these

12.

Which of the following is equivalent relation to the constraint  $x=2$  of a linear programming problem?

$X \geq 2$

$x < 2$

$x < 2$  and  $x \geq 2$

**$x < 2$  and  $X > 2$**

13. While using simplex method for a LPP if there are 4 standard equations in 8 variables then number of non basic variables will be \_\_\_\_\_

32

12

4

2

| Basic          | X <sub>1</sub> | X <sub>2</sub> | X <sub>3</sub> | X <sub>4</sub> | R <sub>1</sub> | R <sub>2</sub> | Sol. |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|------|
| r              | -1/3           | 4/3            | 0              | -1             | -8/3           | 0              | 20   |
| X <sub>3</sub> | 2/3            | 1/3            | 1              | 0              | 1/3            | 0              | 20   |
| R <sub>2</sub> | -1/3           | 4/3            | 0              | -1             | -5/3           | 1              | 20   |

The above problem is for minimization. Then what will be the leaving variable in the table?

14. \_\_\_\_\_

X<sub>1</sub>

X<sub>2</sub>

R<sub>1</sub>

R<sub>2</sub>

15. In the purchasing model without any shortage(Wilsonsmodel) which of the following quantity does not vary?

Supply

**Demand**

Inventory

Transportation cost

16. How many decision variables are involved in the inventory model with shortages?

One

Two

Three

Four

17. Which of the following rule is used in order to minimize the decision variables in any inventory model?

Derivative test

Simplex method

PERT

Graphical method

$$Q^* = \sqrt{\frac{2C_1D}{C_2}} \sqrt{\frac{R}{R-D}}$$

Which of the following substitution in \_\_\_\_\_, the Manufacturing Model with no shortage can be reduce into the Purchasing model with no shortage?

18.

R→0

R=D

R>D or R<D

R→∞

19. ABC analysis depends on the

Quality of materials

Cost of materials

Annual consumption value of materials

**Quantity of materials used**

## **2-Marks Questions:-**

If (-x,-6) satisfy the constraint:  $x+y \leq 12$ , then find the minimum values of x.

Write the basic assumptions of:

- (i) Economic Order Quantity with Price breaks
- (ii) Dynamic Order Quantity

---

### **3-Marks Questions:-**

The demand for an item is 15000 units / year, cost of one purchase is Rs. 200 and the holding cost is Rs. 1 per unit per year. If the shortage cost is Rs. 5 / year / item. Then determine the Optimum Order Quantity.

---

One Missing

### **5-Marks Questions:-**

Minimize the objective function;

$$f(x,y) = 5x+8y$$

subject to the constraints

$$x \leq 4$$

$$y \geq 2$$

$$x + y = 5$$

$$x, y \geq 0$$

---

If a salesperson has to supply a certain item of 100 units to his customer on every Friday (and only then). He obtains the item from a local supplier at Rs.60/ unit.

Determine the Economic lot size and the optimal cost if:

- (i) Ordering and transportation expenses are Rs.150 per order.
  - (ii) Holding cost is 15% per year of product carrying cost from supplier.
-





**Question No: 1 ( Marks: 1 ) - Please choose one**

---

EST and EFT of activities are calculated in

- ▶ Forward pass
- ▶ Backward pass
- ▶ Path does not effected

**Question No: 2 ( Marks: 1 ) - Please choose one**

---

\_\_\_\_\_ may be less than most likely time estimate

- ▶ Pessimistic time estimate
- ▶ Smallest time estimate
- ▶ Optimistic Time estimate

**Question No: 3 ( Marks: 1 ) - Please choose one**

---

The dummy activities consume

- ▶ No time, no resources
- ▶ No time but some resources
- ▶ Some resources in minimum time
- ▶ None of these

**Question No: 4 ( Marks: 1 ) - Please choose one**

---

If an activity consumes no time and no resources then this activity is called \_\_\_\_\_.

- ▶ dummy activity
- ▶ sequential activity
- ▶ critical activity
- ▶ cyclic activity

**Question No: 5 ( Marks: 1 ) - Please choose one**

---

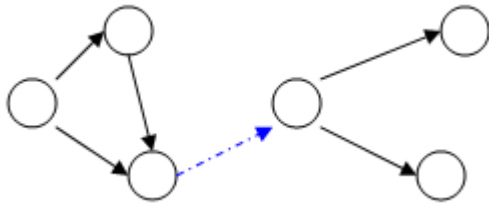
Cost period = ----- × ( No of ordered items )

- ▶ Holding cost
- ▶ Set up cost
- ▶ Stock out cost
- ▶ Item cost

**Question No: 6 ( Marks: 1 ) - Please choose one**

---

The following network is an example of



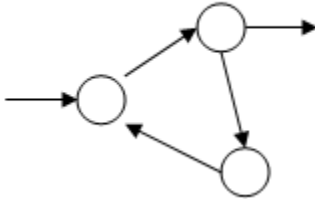
- ▶ Redundancy
- ▶ Cycling
- ▶ Looping

► Merging

**Question No: 7 ( Marks: 1 ) - Please choose one**

---

The following network is an example of



- Redundancy
- Dangling
- Cycling
- Dummy

**Question No: 8 ( Marks: 1 ) - Please choose one**

---

Which one is best describe Micro Economic Planning?

- Distribution of fertilizer
- Improving the layout of a workshop in a company
- Investment planning of the country
- PERT

**Question No: 9 ( Marks: 1 ) - Please choose one**

---

If  $t_0 = 6$ ,  $t_m = 12$  and  $t_p = 18$ , then  $V_{E=}$  \_\_\_\_\_

▶ 12

▶ 2

▶ 4

▶ 144

**Question No: 10 ( Marks: 1 ) - Please choose one**

---

Which inventory model also known as a saw tooth model?

▶ Purchasing Model with no shortages

▶ Purchasing Model with shortages

▶ Manufacturing Model with no shortages

▶ Manufacturing Model with shortages

**Question No: 11 ( Marks: 1 ) - Please choose one**

---

For backward pass computations

▶ Earliest start time  $\geq$  Latest start time

▶ Earliest start time  $\leq$  Latest start time

▶ Earliest start time  $+$  Latest start time = 0

▶ Earliest start time  $=$  Latest start time

**Question No: 12 ( Marks: 1 ) - Please choose one**

---

For an activity if optimistic time, most likely time estimate and pessimistic time estimate are **3**, **6** and **15** respectively then expected time is

- ▶ 4
- ▶ 3
- ▶ 7
- ▶ 20

**Question No: 13 ( Marks: 1 ) - Please choose one**

---

In a quadratic programming problem unlike linear programming problem

- ▶ Only objective function is quadratic
- ▶ Both objective function and constraints are quadratic
- ▶ Only constraints are quadratic
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Solution region of the constraint  $x \geq 0$  is

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**Question No: 17 ( Marks: 1 ) - Please choose one**

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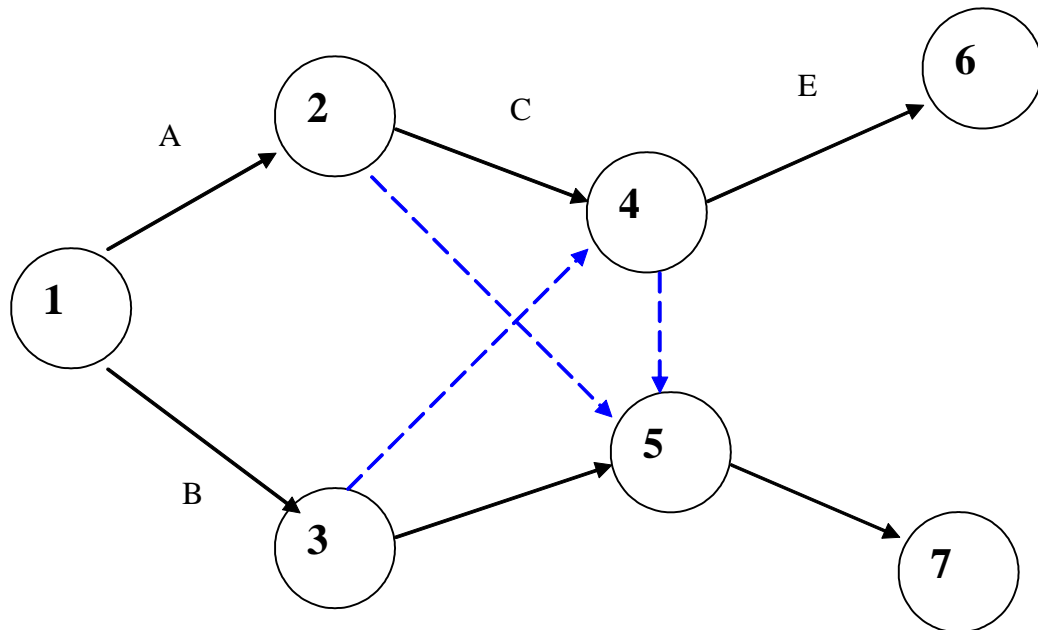
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- ▶ early start and early finish
- ▶ late start and early finish
- ▶ early start and late finish
- ▶ late start and late finish

**Question No: 18 ( Marks: 1 ) - Please choose one**

---

Is this Network legal?



▶ Yes.

▶ No.

**Question No: 19 ( Marks: 1 ) - Please choose one**

---

Total cost per period = Item cost + Order cost + Holding cost + \_\_\_\_\_.

▶ Shortage cost

▶ Optimum Shortage ( $S^*$ )

▶ Economic Order Quantity. ( $Q^*$ )

▶ Maximum Inventory. ( $I_{max.}$ )

**Question No: 20 ( Marks: 1 ) - Please choose one**

---

$$K = Z \times (\text{---})$$

Where K is called service factor.

$\sqrt{\pi/2}$

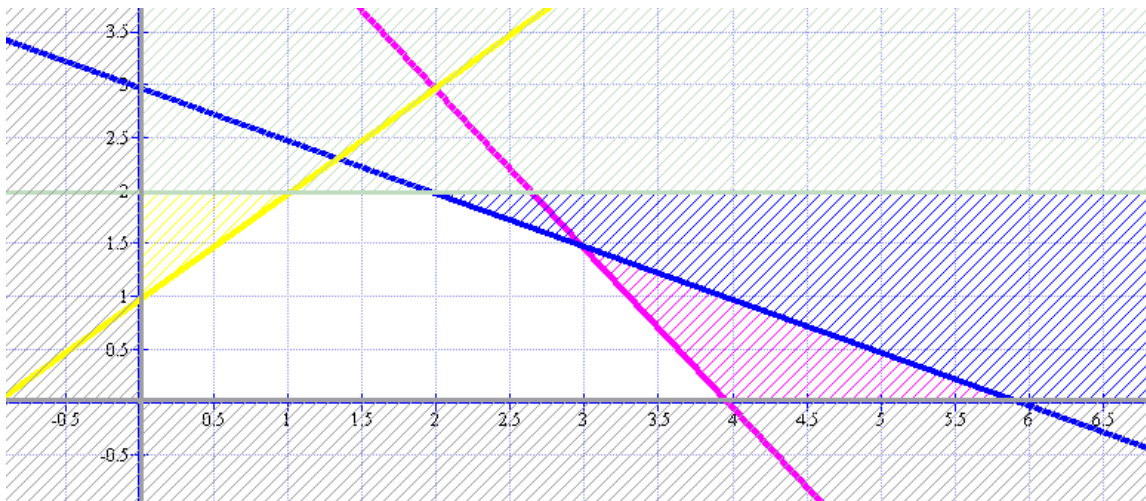
$\sqrt{2/\pi}$

$\sqrt{2\pi/3}$

$\sqrt{3\pi/2}$

---

**Question No: 21 ( Marks: 2 )**



Using above graph, Write down the equation (Blue shaded area).

---

**Question No: 22 ( Marks: 3 )**

Draw a net work diagram for the following dependency relationship.  
A controls F, G and H; B controls G and H with H controlled by C.

**Question No: 23 ( Marks: 5 )**

---

**Draw the graph of the following constraints.**

$$\begin{aligned}x &\leq 4 \\ 2y &\leq 12 \\ 2x + 3y &\leq 18 \\ x \geq 0, \quad y &\geq 0\end{aligned}$$

**Question No: 24 ( Marks: 10 )**

---

Solve by Graphical method:  
Shows corner points and optimize the objective function.

$$\text{Max. } Z = 5x_1 - 3x_2 + 10$$

Subject to :

$$2x_1 - 3x_2 \geq 6$$

$$x_1 + 4x_2 \leq 10$$

$$2x_1 + 5x_2 \geq 4$$

$$x_1 \geq 0, \quad x_2 \geq 0$$

1. \_\_\_\_\_ employs a different modeling and solution logic than linear programming
  - (a). Transportation Model
  - (b). Inventory Control Model
  - (c). Dynamic Programming**
  - (d). None of the above
  
2. To identify and maintain the proper precedence relationship between activities those are not connected by event, we introduce
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  - (c).  $V_t = \left(\frac{t_p - t_m}{6}\right)^2$
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- (c).  $FS \leq TS$
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9. Best possible time estimate that a given activity would take under normal conditions which often exist, is called

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- (a). One sixth of the difference between pessimistic time estimates and optimistic time estimates**
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Which one is best describe Sectoral planning

- ? **Inventory Planning in agriculture**
- ? Improving the layout of a workshop in a company
- ? Simulation Modeling of the Economy of the country
- ? None of these.

\_\_\_\_\_ is the most appropriate to situations where we maintain a relative stable employment levels and utilize the resource at a more constant rate

- ? (a). Resource Leveling Program
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If the slack time is zero, it means that the project will be

- ? Delayed
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The amount of an activity can be delayed without affecting the early start time of any other job, is called

- ? Free Slack
- ? Independent Slack
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- ? None of these.

**Question No: 1 ( Marks: 1 ) - Please choose one**

---

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**Question No: 2 ( Marks: 1 ) - Please choose one**

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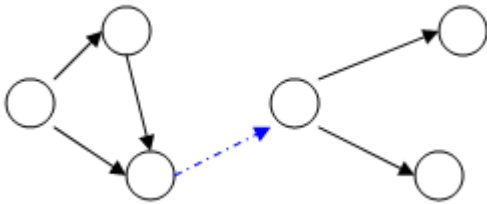
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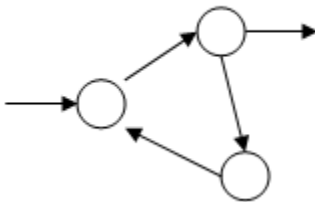


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**Question No: 9 ( Marks: 1 ) - Please choose one**

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- ▶ 12
- ▶ 2
- ▶ **4**
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**Question No: 10 ( Marks: 1 ) - Please choose one**

---

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---

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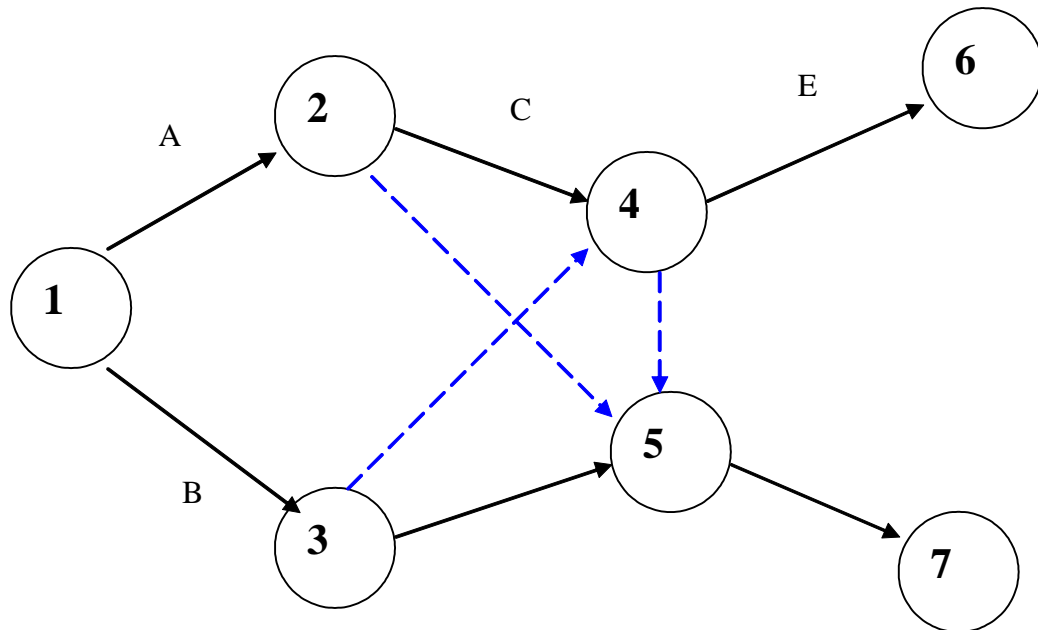
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**Question No: 18 ( Marks: 1 ) - Please choose one**

---

Is this Network legal?



► Yes.

► **No.**

**Question No: 19 ( Marks: 1 ) - Please choose one**

---

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- Shortage cost
- Optimum Shortage (S\*)
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**Question No: 20 ( Marks: 1 ) - Please choose one**

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- ? Total Slack
- ? None of these.

**Question No: 1 ( Marks: 1 ) - Please choose one**

---

EST and EFT of activities are calculated in

- ▶ Forward pass
- ▶ Backward pass
- ▶ Path does not effected

**Question No: 2 ( Marks: 1 ) - Please choose one**

---

\_\_\_\_\_ may be less than most likely time estimate

▶ **Pessimistic time estimate**

▶ Smallest time estimate

▶ **Optimistic Time estimate**

---

**Question No: 3 ( Marks: 1 ) - Please choose one**

The dummy activities consume

▶ **No time, no resources**

▶ No time but some resources

▶ Some resources in minimum time

▶ None of these

---

**Question No: 4 ( Marks: 1 ) - Please choose one**

If an activity consumes no time and no resources then this activity is called \_\_\_\_\_.

▶ **dummy activity**

▶ sequential activity

▶ critical activity

▶ cyclic activity

---

**Question No: 5 ( Marks: 1 ) - Please choose one**

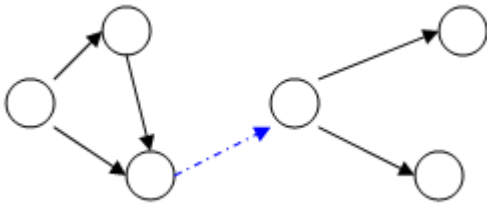
Cost period = ----- × ( No of ordered items)

- ▶ Holding cost
- ▶ Set up cost
- ▶ Stock out cost
- ▶ **Item cost**

**Question No: 6 ( Marks: 1 ) - Please choose one**

---

The following network is an example of

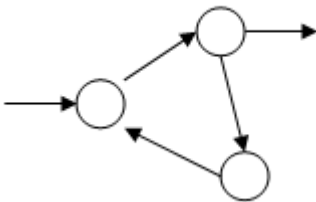


- ▶ Redundancy
- ▶ Cycling
- ▶ Looping
- ▶ **Merging**

**Question No: 7 ( Marks: 1 ) - Please choose one**

---

The following network is an example of



- ▶ **Redundancy**

- ▶ Dangling
- ▶ Cycling
- ▶ Dummy

**Question No: 8 ( Marks: 1 ) - Please choose one**

---

Which one is best describe Micro Economic Planning?

- ▶ Distribution of fertilizer
- ▶ **Improving the layout of a workshop in a company**
- ▶ Investment planning of the country
- ▶ PERT

**Question No: 9 ( Marks: 1 ) - Please choose one**

---

If  $t_0 = 6$ ,  $t_m = 12$  and  $t_p = 18$ , then  $V_i =$  \_\_\_\_\_

- ▶ 12
- ▶ 2
- ▶ **4**
- ▶ 144

**Question No: 10 ( Marks: 1 ) - Please choose one**

---

Which inventory model also known as a saw tooth model?

- ▶ **Purchasing Model with no shortages**
- ▶ Purchasing Model with shortages
- ▶ Manufacturing Model with no shortages
- ▶ Manufacturing Model with shortages

**Question No: 11 ( Marks: 1 ) - Please choose one**

---

For backward pass computations

- ▶ Earliest start time  $\geq$  Latest start time
- ▶ Earliest start time  $\leq$  Latest start time
- ▶ Earliest start time  $+$  Latest start time = 0
- ▶ Earliest start time  $=$  Latest start time

**Question No: 12 ( Marks: 1 ) - Please choose one**

---

For an activity if optimistic time, most likely time estimate and pessimistic time estimate are **3**, **6** and **15** respectively then expected time is

- ▶ 4
- ▶ 3
- ▶ **7**
- ▶ 20

**Question No: 13 ( Marks: 1 ) - Please choose one**

---

In a quadratic programming problem unlike linear programming problem

- ▶ Only objective function is quadratic
- ▶ Both objective function and constraints are quadratic
- ▶ Only constraints are quadratic
- ▶ At least one of objective function or constraint must be quadratic

**Question No: 14 ( Marks: 1 ) - Please choose one**

---

Solution region of the constraint  $x \geq 0$  is

- ▶ Half plane to the right of straight line  $x = 0$
- ▶ Half plane to the right of y-axis
- ▶ Half plane to the region where abscissas are non-negative
- ▶ All are equivalent

**Question No: 15 ( Marks: 1 ) - Please choose one**

---

A dummy activity is a simulated activity of sorts, one that is of \_\_\_\_\_ duration and is created for the sole purpose of demonstrating a specific relationship and path of action on the arrow diagramming method.

- ▶ Zero
- ▶ Minimum
- ▶ Maximum
- ▶ Average

**Question No: 16 ( Marks: 1 ) - Please choose one**

---

Activity definition refers to the process of parsing a project into a number of individual tasks which must be completed \_\_\_\_\_ the deliverables can be considered completed. Activity definitions rely on a number of specific input processes.

- ▶ **before**
- ▶ both before and after
- ▶ after

**Question No: 17 ( Marks: 1 ) - Please choose one**

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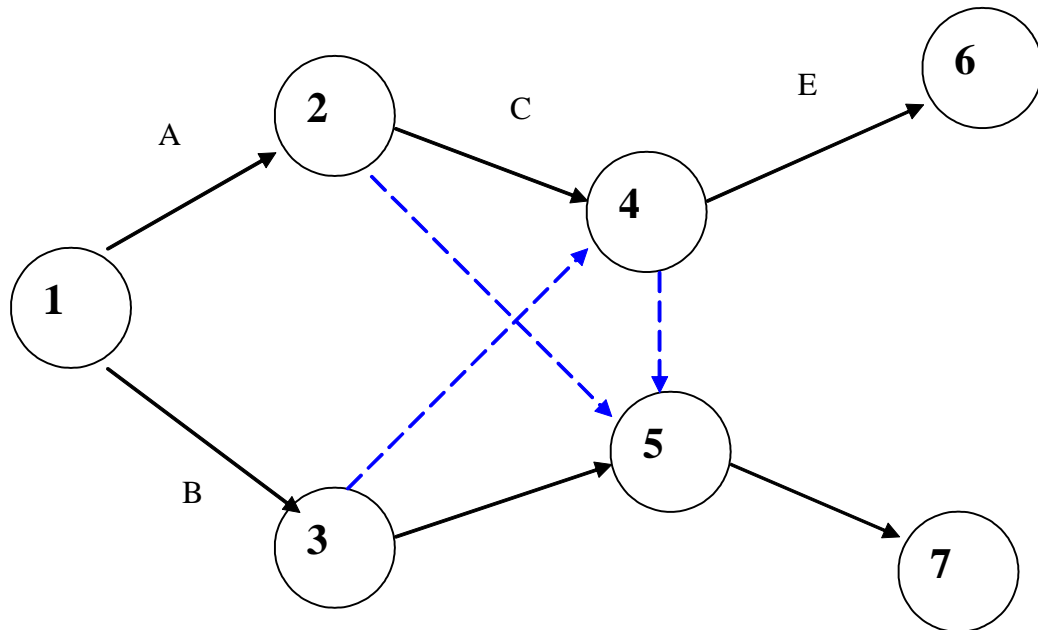
A forward pass is used to determine and calculate the \_\_\_\_\_ dates, through utilization of a previously specified start date.

- ▶ **early start and early finish**
- ▶ late start and early finish
- ▶ early start and late finish
- ▶ late start and late finish

**Question No: 18 ( Marks: 1 ) - Please choose one**

---

Is this Network legal?



► Yes.

► **No.**

**Question No: 19 ( Marks: 1 ) - Please choose one**

---

Total cost per period = Item cost + Order cost + Holding cost + \_\_\_\_\_.

- Shortage cost
- Optimum Shortage ( $S^*$ )
- Economic Order Quantity. ( $Q^*$ )
- Maximum Inventory. ( $I_{max.}$ )

**Question No: 20 ( Marks: 1 ) - Please choose one**

---

$$K = Z \times (\text{---})$$

Where K is called service factor.

▶  $\sqrt{\pi/2}$

---

▶  $\sqrt{2/\pi}$

▶  $\sqrt{2\pi/3}$

▶  $\sqrt{3\pi/2}$