

POSTAL Book Package

2023

Mechanical Engineering

Objective Practice Sets

Industrial Engineering

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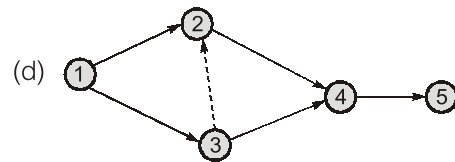
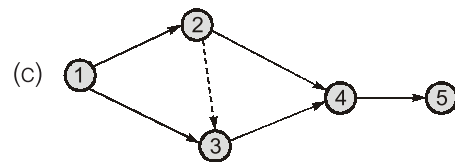
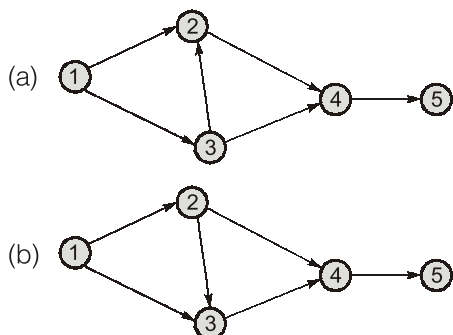
PERT and CPM

MCQ and NAT Questions

- Q.1** The critical path in PERT/CPM is
- (a) the shortest path in the network from start to the end and defines the minimum time to complete the project.
 - (b) the longest path in the network from start to the end and defines the maximum time to complete the project.
 - (c) the shortest path in the network from start to the end and defines the maximum time to complete the project
 - (d) the project longest path in the network from start to the end and defines the minimum time required to complete the project.
- Q.2** Expected time of an activity is based on the assumption that activity follows
- (a) Poisson distribution
 - (b) Binomial distribution
 - (c) Beta distribution
 - (d) Alpha distribution
- Q.3** Given below is a table

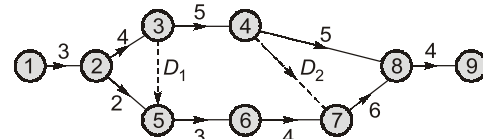
Activity	Preceding Activity
1 - 2	-
1 - 3	-
2 - 3	1 - 2
2 - 4	1 - 2
3 - 4	1 - 3, 2 - 3
4 - 5	2 - 4, 3 - 4

The correct network diagram is



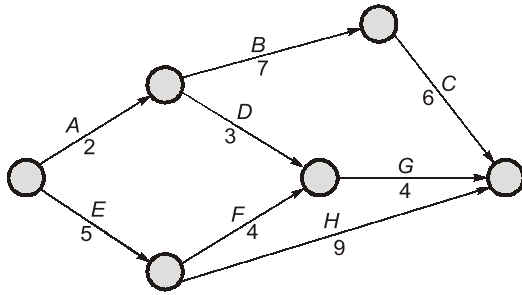
- Q.4** If $\sigma_A, \sigma_B, \sigma_C$ are the standard deviation of the parts A, B and C respectively, then the standard deviation (s) of the assembly is
- (a) $\sigma = \sqrt{\sigma_A^2 + \sigma_B^2 + (\sigma_C)^2}$
 - (b) $\sigma = \sigma_A^2 + \sigma_B^2 + \sigma_C^2$
 - (c) $\sigma = (\sigma_A \times \sigma_B \times \sigma_C)^{1/3}$
 - (d) $\sigma = \frac{\sigma_A + \sigma_B + \sigma_C}{3}$

- Q.5** In the network shown below the critical path is along



- (a) 1-2-3-4-8-9
 - (b) 1-2-3-5-6-7-8-9
 - (c) 1-2-3-4-7-8-9
 - (d) 1-2-5-6-7-8-9
- Q.6** The variance (V_c) for critical path $a \rightarrow b = 4$ time units, $b \rightarrow c = 16$ time units, $c \rightarrow d = 4$ time units, $d \rightarrow e = 1$ time unit. The standard deviation of the critical path $a \rightarrow e$ is:
- (a) 3
 - (b) 4
 - (c) 5
 - (d) 6

Q.48 Calculate total float for activity *F* in the following project.



Q.49 The following table gives the activities in a construction project and other related information:

Activity	Optimistic time t_0 (days)	Most likely time t_m (days)	Pessimistic time t_p (days)
1 - 2	12	15	24
1 - 3	6	8	10
2 - 3	10	12	14
2 - 4	6	6	6
3 - 4	7	9	11
4 - 5	13	17	27

The minimum number of days so that the probability that project cannot be completed is 5%, then the number of days is _____.

Multiple Select Questions (MSQ)

Q.50 The following table gives the activities in a construction project and other related information:

Activity	t_o (days)	t_m (days)	t_p (days)
1-2	12	15	18
1-3	6	8	10
2-3	10	12	14
2-4	5	5	5
3-4	6	8	10
4-5	6	8	16

Which of the following options is/are correct for above project?

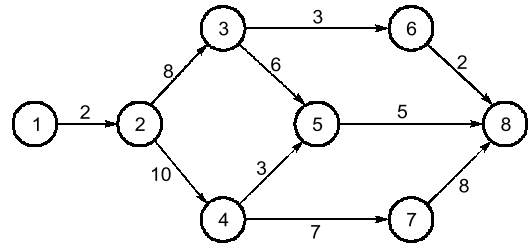
- (a) Critical path duration is 44 days.
- (b) Critical path is 1-2-3-4-5.
- (c) Expected time for activity 3-4 is 9.
- (d) Expected time for activity 2-3 is 5.

Q.51 For a network diagram in PERT, critical path duration is 30 days and the variance of critical activities along the path is 0.444, 2.778, 1, 1.778 and 0.111.

Which of the following options is/are correct?

- (a) Standard deviation along the critical path is 2.472 days.
 - (b) Standard deviation along the critical path is 3.477 days.
 - (c) Project duration for 84.13% probability of project completion is 32.472 days.
 - (d) Project duration for 84.13% probability of project completion is 33.477 days.
- For 84.13% probability, $z = 1$

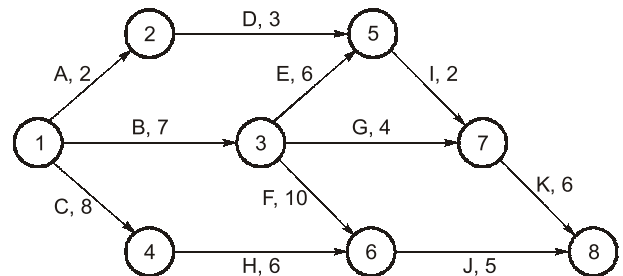
Q.52 The network diagram of a project is given below with time duration of the activities (in days).



Which of the following options is/are correct?

- (a) Critical path is 1-2-4-7-8.
- (b) Critical path duration is 27 days.
- (c) Total float for activity 4-5 is 7 days.
- (d) Free float for activity 4-5 is 6 days.

Q.53 The network diagram with activity duration (in days) for a project is given below:



Which of the following options is/are correct?

- (a) Total float for activity 1-4 is 3.
- (b) Total float for activity 3-7 is 4.
- (c) Free float for activity 1-4 is 0.
- (d) Free float for activity 3-7 is 4.



Answers PERT and CPM

1. (b) 2. (c) 3. (b) 4. (a) 5. (b) 6. (c) 7. (b) 8. (a) 9. (c)
 10. (b) 11. (d) 12. (d) 13. (b) 14. (b) 15. (b) 16. (b) 17. (c) 18. (b)
 19. (c) 20. (b) 21. (c) 22. (c) 23. (c) 24. (b) 25. (b) 26. (c) 27. (a)
 28. (b) 29. (b) 30. (d) 31. (b) 32. (b) 33. (b) 34. (c) 35. (d) 36. (a)
 37. (a) 38. (d) 39. (c) 40. (c) 41. (2) 42. (0.5) 43. (5) 44. (18) 45. (27)
 46. (6) 47. (33) 48. (2) 49. (60.3) 50. (a, b) 51. (a, c) 52. (a, b, c) 53. (a, c, d)

Explanations PERT and CPM

1. (b)

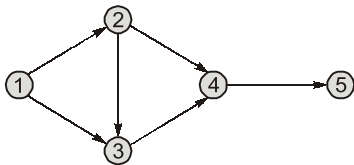
The critical path in PERT/CPM is the longest path in the network from start to the end, which takes the maximum time to complete the project and the time taken along this path is known as expected project completion time.

2. (c)

Expected time of an activity is based on the assumption that activity follows beta distribution.

3. (b)

The correct network diagram is



4. (a)

Standard deviation of the assembly.

$$\sigma = \sqrt{\sigma_A^2 + \sigma_B^2 + \sigma_C^2}$$

5. (b)

The critical path is the longest path

6. (c)

$$\sigma = \sqrt{4 + 16 + 4 + 1} = 5$$

7. (b)

Dummy activity is an activity which only shows the dependency or relationship of one activity with the other but does not consume any time or resources for its completion. It is used to satisfy precedence requirements.

8. (a)

Latest start time of an activity in CPM is the latest occurrence time of the successor event minus the duration of the activity.

9. (c)

PERT is less deterministic and has more dispersion. It is based on probabilistic activities and used mainly for research and development projects.

10. (b)

$$t_e = \frac{t_p + t_o + 4t_m}{6} = 10.33$$

11. (d)

Critical path 1-3-4-6

$$T_E = 20 \text{ days}, V_{ar} = 4, S = 24 \text{ days}$$

$$\text{Prob. } \left[z \leq \frac{S - T_E}{\sigma} \right] = \text{Prob. } \left[z \leq \frac{24 - 20}{2} \right]$$

$$= \text{prob. } [z \leq 2] = 97.7\%$$

12. (d)

Activity consumes both time & resource while event consume only time not resources.

13. (b)

