CLASS TEST

S.I.: 02DLSKCE_IJKLM_170926

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CPMT-PERT

CIVIL ENGINEERING

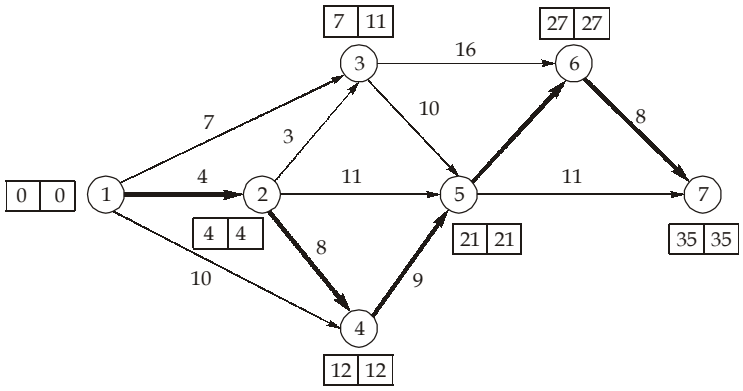
Date of Test : 17/09/2026

ANSWER KEY ➤

1.	(a)	6.	(d)	11.	(c)	16.	(c)	21.	(a)
2.	(c)	7.	(a)	12.	(d)	17.	(d)	22.	(a)
3.	(a)	8.	(c)	13.	(a))	18.	(a)	23.	(c)
4.	(d)	9.	(c)	14.	(b)	19.	(b)	24.	(c)
5.	(b)	10.	(a)	15.	(d)	20.	(b)	25.	(d)

DETAILED EXPLANATIONS

1. (a)

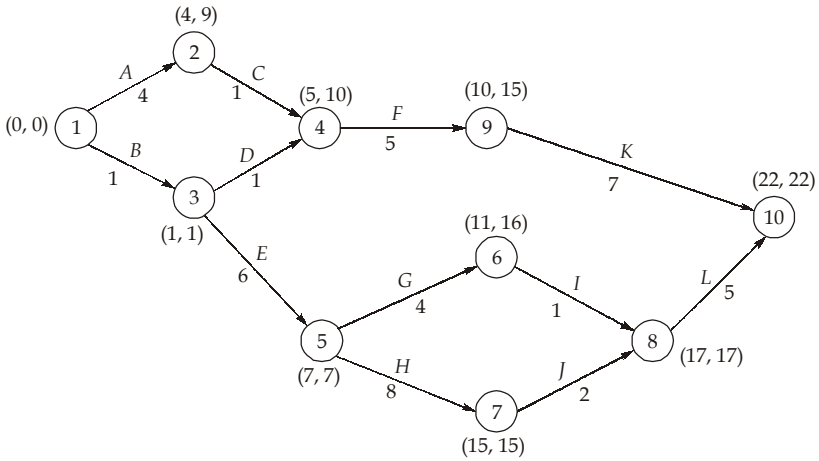


∴ The critical path is 1-2-4-5-6-7 and the project duration is 35 days.

2. (c)

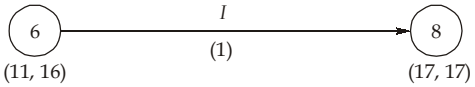
All the arrows in A-O-N network do not require any time or resources and represent only the dependency relationships.

3. (a)



Activity times in days

For activity-*I*,



$(EST)_i = 11$ days

$(EFT)_j = 11 + 1 = 12$ days

$(LFT)_j = 17$ days

$(LST)_i = 17 - 1 = 16$ days

∴ Independent float $= (T_E)_j - (T_L)_i - t_{ij}$

$= 17 - 16 - 1 = 0$

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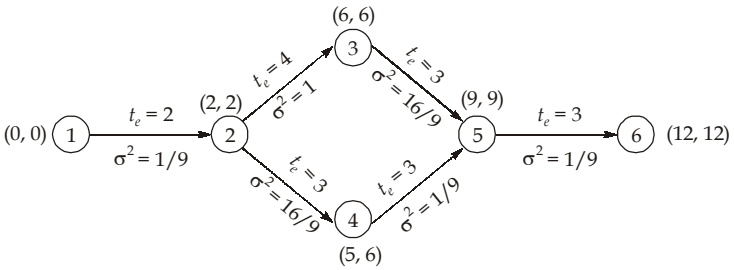
$$\text{Free float} = (T_E)_j - (T_E)_i - t_{ij}$$
$$= 17 - 11 - 1 = 5$$

4. (d)

5. (b)

Expected times (in days) and the variances are shown in the network below.



$$\text{Using } t_e = \left(\frac{t_0 + 4t_m + t_p}{6}\right) \text{ and } \sigma^2 = \left(\frac{t_0 - t_p}{6}\right)^2 \text{ for all activities.}$$

The path 1-2-3-5-6 is the critical path and expected project duration is 12 days.

$$T_{cp} = 12 \text{ days and } T = 12 \text{ days}$$
$$\sigma_{cp} = \sqrt{\sigma_{1-2}^2 + \sigma_{2-3}^2 + \sigma_{3-5}^2 + \sigma_{5-6}^2}$$
$$= \sqrt{\frac{1}{9} + 1 + \frac{16}{9} + \frac{1}{9}} = 1.732$$
$$\therefore \quad \text{Normal deviate, } Z = \frac{T - T_{cp}}{\sigma} = \frac{12 - 12}{1.732}$$
$$\Rightarrow \quad Z = 0$$

Probability of completely the project in 12 days = 50%

6. (d)

$$\text{C.R.F} = \left(\frac{A}{P}, i, n\right) = \left[\frac{i(1+i)^n}{(1+i)^n - 1}\right]$$
$$= \frac{0.06(1+0.06)^8}{(1+0.06)^8 - 1} = 0.1610$$

7. (a)

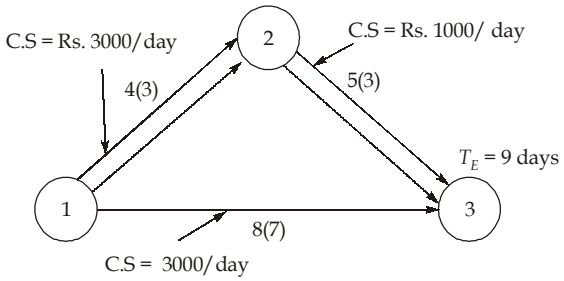
8. (c)

$$FDB = 1 - \left(\frac{C_s}{C_i}\right)^{1/n} = 1 - \left(\frac{2000}{20000}\right)^{1/4}$$
$$= 0.4376 \simeq 0.438$$

9. (c)

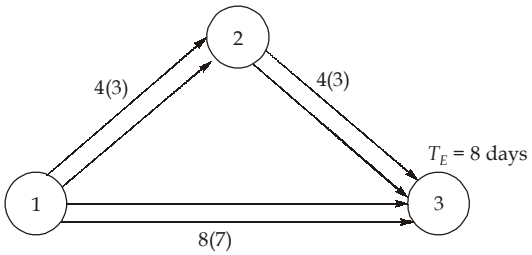
$$\text{Sinking fund factor} = \frac{i}{(1+i)^n - 1} = \frac{0.05}{(1+0.05)^2 - 1}$$
$$= 0.4878 \simeq 0.49$$

10. (a)



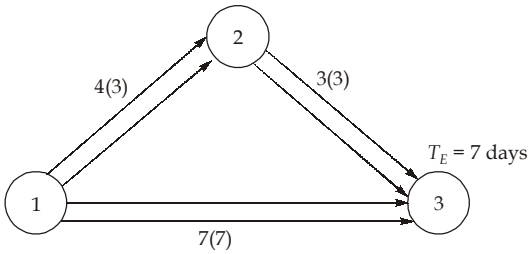
Total cost, T.C. = (4000 + 5000 + 8000) + 9 × 2000
= 17000 + 18000 = Rs. 35000

Crashing activity 2–3 and 1–3 by 1 days:



T.C. = 35000 – 2000 + 1000 × 1 = Rs. 34000

Further crashing activity 2–3 and 1–3 by 1 day:



T.C = 34000 – 2000 + 4000 = Rs .36000

Hence minimum cost = Rs. 34000

Optimum duration = 8 days

11. (c)

$$D = (C_i - C_s)\frac{(n-m+1)}{\frac{n(n+1)}{2}}$$

Depreciation at the end of 1st year,

$$D_1 = (30,000 - 1500)\frac{(8-1+1)}{\frac{8(8+1)}{2}}$$

$$= 28500 \times \frac{8}{36} = 6333.33$$

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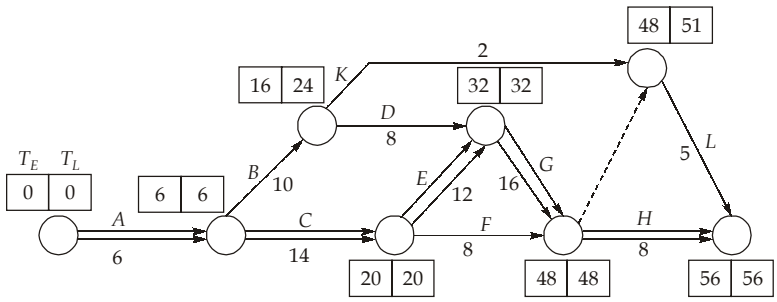
∴ Book value at the end of 1st year or beginning of 2nd year,

$$B_1 = 30000 - 6333.33$$
$$= \text{Rs. } 23666.667$$

Similarly, $$D_2 = 28500 \times \frac{(8-2+1)}{36} = \text{Rs. } 5541.667$$

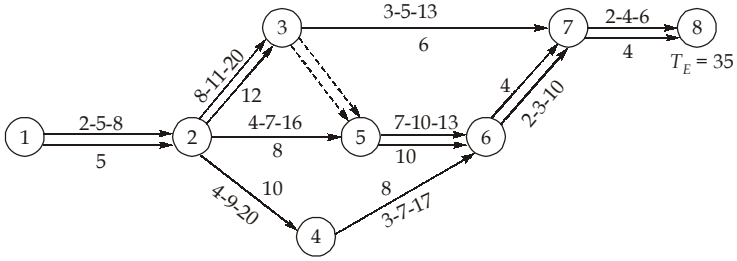
$$B_2 = 23666.667 - 5541.667$$
$$= 18125.000 = \text{Book value at the beginning of } 3^{rd} \text{ year.}$$

12. (d)



For activity K,
$$EST = 16$$
$$LST = 49$$
∴ $$F_T = 33 \text{ days}$$
$$EFT = 18$$
$$LFT = 51$$
$$F_T = LST - EST = LFT - EFT = 33 \text{ days}$$

13. (a))



$$\sigma = \sqrt{\sigma_{1-2}^2 + \sigma_{2-3}^2 + \sigma_{3-5}^2 + \sigma_{5-6}^2 + \sigma_{6-7}^2 + \sigma_{7-8}^2}$$
$$= \sqrt{\left(\frac{8-2}{6}\right)^2 + \left(\frac{20-8}{6}\right)^2 + 0 + \left(\frac{13-7}{6}\right)^2 + \left(\frac{10-2}{6}\right)^2 + \left(\frac{6-2}{6}\right)^2}$$
$$= \sqrt{1+4+1+1.778+0.444}$$
$$= \sqrt{8.222} = 2.867 \text{ days}$$

For $P = 95\%$

$$z = 1 + \frac{(2-1)}{(97.72-84.13)} \times (95 - 84.13) = 1.79$$

But $$z = \frac{T_S - T_E}{\sigma}$$

$$\Rightarrow \quad 1.79 = \frac{T_S - 35}{2.867}$$

$$\Rightarrow \quad T_S = 40.13 \text{ days}$$

14. (b)

Gross weight of tractor = 16000 kg = 16 t

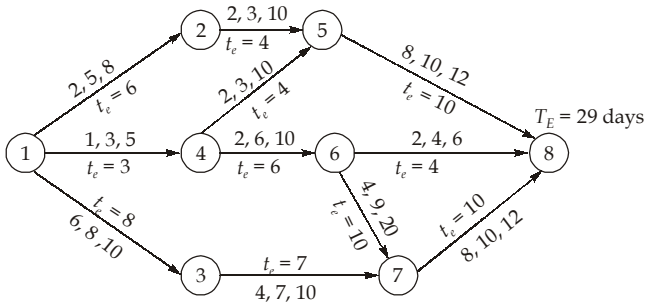
Rolling resistance offered by haul road = 16 × 50 = 800 kg

$$\text{Load on driving tyres} = \frac{70}{100} \times 16000 = 11200 \text{ kg}$$

Maximum possible rimpull prior to slippage of tyres = 0.65 × 11200 = 7280 kg

∴ Maximum effective rimpull = 7280 – 800 = 6480 kg

15. (d)



$$\sigma^2 = \left(\frac{5-1}{6}\right)^2 + \left(\frac{10-2}{6}\right)^2 + \left(\frac{20-4}{6}\right)^2 + \left(\frac{12-8}{6}\right)^2$$

$$= \left(\frac{2}{3}\right)^2 + \left(\frac{4}{3}\right)^2 + \left(\frac{8}{3}\right)^2 + \left(\frac{2}{3}\right)^2$$

$$= \frac{4 + 16 + 64 + 4}{9} = 9.777$$

$$\therefore \quad \sigma = \sqrt{9.777} = 3.126 \text{ days}$$

Since expected project completion time is 29 days so the probability of completion of project is 29 days in 50%.

16. (c)

17. (d)

18. (a)

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19. (b)

20. (b)

Risk is the occurrence of events that have consequences like increased cost and inability to meet specifications.

21. (a)

22. (a)

$$\text{Variance } (\sigma^2) = \left(\frac{t_p - t_0}{6}\right)^2$$

Person A, $\sigma^2 = \left(\frac{8-4}{6}\right)^2 = 0.44$

Person B, $\sigma^2 = \left(\frac{10-5}{6}\right)^2 = 0.69$

Person C, $\sigma^2 = \left(\frac{9-3}{6}\right)^2 = 1$

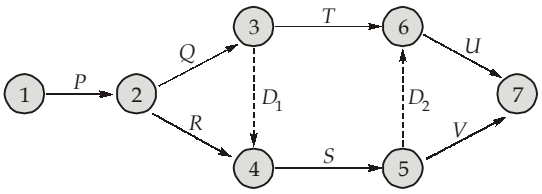
Person D, $\sigma^2 = \left(\frac{12-6}{6}\right)^2 = 1$

$\because$ Variance is least for person A.

Hence 'A' is most certain about his estimates of time.

23. (c)

Network Diagram :



$\therefore$ 2 dummies are required.

24. (c)

ABC analysis is based on speed of movement of stock.

Items

A → Very important and valuable

B → Important

C → Least important

25. (d)

■■■■