Construction Materials and Management Test 2

Number of Questions: 30 **Time: 75 min.**

Directions for questions 1 to 30: Select the correct alternative from the given choices.

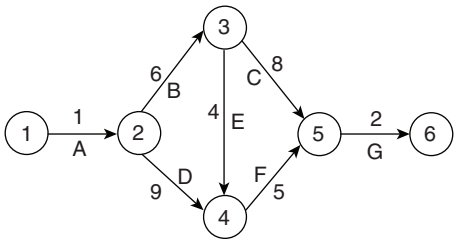
1. The probability distribution taken to represent the completion time in PERT analysis is _____
(A) Gamma distribution
(B) Normal distribution
(C) Beta distribution
(D) Log normal distribution

2. The probability of completion of any activity within its expected time is _____
(A) 50% (B) 84.1%
(C) 99.9% (D) 100%

3. The proportion of cement : *F.A* : *C.A* in a given concrete is 1 : 2 : 4; then the mix refers to
(A) M20 (B) M15
(C) M10 (D) M5

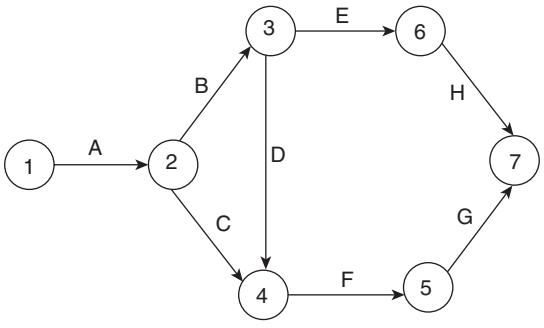
4. Negative slack occurs when
(A) Dummy activities are large in number
(B) Events stick to their schedule
(C) Dummy activities do not exist
(D) Deficiency of resources occurs

5.



Duration of the project shown in the network is ____
(Note : Durations given above are in days)
(A) 18 (B) 17
(C) 16 (D) 15

6. In the network shown in the figure, the activity '*F*' can be started only when



(A) Activity *B* is completed
(B) Activity *C* is completed
(C) Activity *D* is completed
(D) Activity *C* and *D* both are completed

7. Which of the following pairs are incorrect with reference to ordinary Portland cement?
(i) Initial setting time - 30 minutes
(ii) Final setting time – 10 hours
(iii) Normal consistency – 10%
(iv) All are correct
(A) iv (B) ii and iii
(C) iii only (D) i and iii

8. The most commonly used admixture to accelerate the initial setting time of concrete is _____.
(A) Gypsum
(B) Calcium Carbonate
(C) Calcium Chloride
(D) Calcium Ferrate

9. A sand is said to be unsuitable for construction if it has *F.M.* more than _____
(A) 2.9 (B) 3.2
(C) 3.4 (D) 3.9

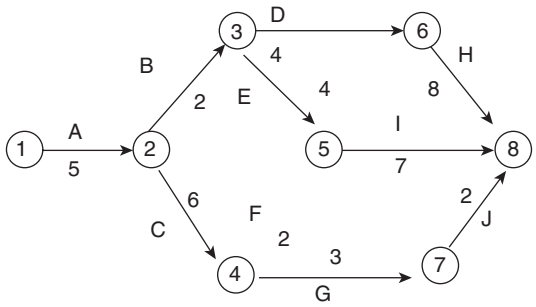
10. The standard size of specimen for conducting the modules of rupture of concrete is
(A) 15 × 15 × 60 cm
(B) 15 × 15 × 65 cm
(C) 15 × 15 × 70 cm
(D) 15 × 15 × 75 cm

11. To make one cubic meter of 1 : 2 : 4 by volume centrete, the volume of coarse aggregate required is ____
(A) 0.95 m^3 (B) 0.85 m^3
(C) 0.75 m^3 (D) 0.65 m^3

12. In drawing *AOA* network and making time computations, following processes are involved.
1. Activity listing
2. Work breakdown structure
3. Activity time allotment
4. Consideration of available resources for each activity
5. Activity dependencies
6. Float computations
7. Backward path computation
8. Project duration
9. Forward path computation.

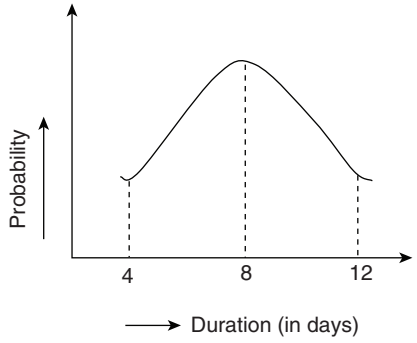
What is the correct sequence of the process given above?
(A) 1,2,4,3,9,7,5,6,8
(B) 4,1,3,2,9,5,7,8,6
(C) 2,1,4,3,5,9,8,7,6
(D) 1,3,2,4,5,9,7,8,6

13. A building project consist of 10 activities, represented by the network shown below. Find the critical path of the network?



(A) 1 - 2 - 4 - 7 - 8 (B) 1 - 2 - 3 - 5 - 8
(C) 1 - 2 - 4 - 5 - 8 (D) 1 - 2 - 3 - 6 - 8

14. For a given probability distribution curve,

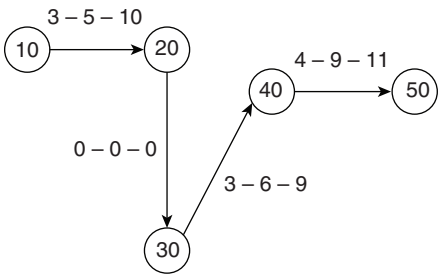


Match the following:

(i) Optimistic time (a) 12
(ii) Most likely time (b) 4
(iii) Expected time (c) 8
(iv) Pessimistic time

(A) i - b, ii - b, iii - c, iv - a
(B) i - a, ii - b, iii - b, iv - c
(C) i - a, ii - c, iii - c, iv - b
(D) i - b, ii - c, iii - c, iv - a

15. For the path of a certain network shown below, the expected time and standard deviation will be _____



(A) 15 and 1.75 (B) 20 and 1.93
(C) 15 and 1.5 (D) 20 and 1.75

16. Match List – I with List – II

	List – I		List – II
a.	Piece work contract	1.	Not practiced in government
b.	Lump sum contract	2.	Payment made by detailed measurement of different items
c.	Item rate contract	3.	Adopted for buildings, roads, bridges and electrical works.
d.	Labour contract	4.	Petty works and regular maintenance work.

Codes:

	a	b	c	d
(A)	1	2	3	4
(B)	2	3	4	5
(C)	5	4	3	2
(D)	4	3	2	1

17.

	List – I		List – II
1.	Setting time of cement	a.	Le- chatelier's apparatus
2.	Consistency of cement	b.	Air Permeability test
3.	Soundness of cement	c.	Vicat apparatus
4.	Fineness	d.	Pycnometer

Choose the correct one from the following

(A) 1 - c, 2 - c, 3 - b, 4 - a
(B) 1 - c, 2 - a, 3 - a, 4 - d
(C) 1 - c, 2 - c, 3 - a, 4 - b
(D) 1 - c, 2 - a, 3 - a, 4 - d

18.

	Type of work	Slump recommended
1.	Concrete for road works	20 - 28mm
2.	Ordinary RCC work	50 - 100mm
3.	Mass concrete	75 - 175mm
4.	Columns – retaining walls	12 - 25mm

Which of the following pairs are correctly matched

(A) 1,3 and 4 (B) 1 and 3
(C) 3 and 4 (D) 2 and 4

19. The fineness modulus of *C.A* and *F.A* are given as 7.6 and 2.78 respectively. The economical value of fineness modulues of combined aggregate is 6.4, then the proportion of fine aggregate is _____

(A) 25% (B) 33.33%
(C) 50% (D) 66.67%

20. Considering following strengths of concrete, choose the correct sequence in increasing order.

(1) Cube strength
(2) Cylinder strength
(3) Split tensile strength
(4) Modulus of rupture

(A) 3,4,2,1 (B) 3,4,1,2
(C) 4,3,2,1 (D) 4,3,1,2

21. Number of bricks required for one cubic meter of brick masonry is _____.

(A) 450 (B) 500
(C) 550 (D) 600

22. UPV method of non – destructive testing for concrete is used to determine _____

(1) Compressive strength
(2) Existence of voids
(3) Tensile Strength
(4) Static Modulus of concrete
(5) Dynamic modulus of concrete

(A) 1, 2, 3 and 4 (B) 1 and 3 only
(C) 2 and 5 only (D) 3 and 5 only

23. In shape test of aggregate which one of the following gives the correct slot for flakiness index for a material passing 50 mm sieve and retained on 40 mm sieve?

(A) 25 mm (B) 27 mm
(C) 81 mm (D) 30 mm

24. Identify the sequence of determination of components of a concrete mix as per IS method of mix design Select the correct answer using codes given below.

	List – I		List – II
a.	Cement content	1.	First step
b.	Aggregate content	2.	Second step
c.	Water content	3.	Third step
d.	Water cement ratio	4.	Fourth step

	a	b	c	d
(A)	1	2	3	4
(B)	3	2	4	1
(C)	1	4	2	3
(D)	3	4	2	1

25. The relation between the strength of brick masonry f_w, the strength of bricks f_b, and the strength of mortar f_m is given by (where k_w is coefficient based on layout of the bricks and the joints)

(A) $f_w = \sqrt{k_w \frac{f_b}{f_m}}$ (B) $f_W = K_W \frac{f_b}{f_m}$

(C) $f_W = \sqrt{k_w, f_b f_m}$ (D) $f_W = K_W \sqrt{f_b . f_m}$

26. Match List - I (Wood elements) With List - II (Description)

	List – I		List – II
a.	Pith	1.	Inner most portion of the tree
b.	Sap wood	2.	Inner annual rings Surrounding the pith
c.	Heart wood	3.	Outer most annual rings
d.	Cambium layer	4.	Thin layer of Sap between Sapwood and inner bark

Codes:

	a	b	c	d
(A)	1	3	2	4
(B)	2	4	1	3
(C)	1	4	2	3
(D)	2	3	1	4

27. For an activity $i - j$, the EST,EFT, LST and LFT are given as are 5,24,9, and 29, respectively. Activity duration is 6. Then, Match the List - I, with List - II

	List – I		List – II
a.	Free float	1.	5
b.	Total float	2.	9
c.	Interfering float	3.	13
d.	Independent float	4.	18

Codes:

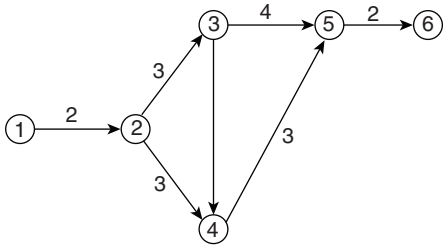
	a	b	c	d
(A)	4	3	1	2
(B)	3	4	1	2
(C)	3	4	2	1
(D)	4	3	2	1

28. Match the List - I with List - II

	List – I		List – II
a.	PERT	1.	Activity based
b.	Node	2.	Event oriented
c.	Dummy	3.	End of job
d.	CPM	4.	Imaginary activity

(A) a - 1, b - 4, c - 3, d - 2
(B) a - 2, b - 4, c - 3, d - 1
(C) a - 2, b - 3, c - 4, d - 1
(D) a - 1, b - 3, c - 4, d - 2

29.



In the network shown, total float for the activities 2 - 4 and 3 - 5 are respectively

(A) 0 and 0 (B) 2 and 2
(C) 2 and 1 (D) 1 and 1

30. Match List - I with List - II

	List – I (Cement mortar for different works)		List – II (Cement : Sand in mortar)
a.	For normal brick work	1.	1 : 4
b.	For plastering work	2.	1 : 3
c.	For grouting the cavernous rocks	3.	1 : 6
d.	For guniting	4.	1 : 1.5

Codes:

	a	b	c	d
(A)	3	2	4	1
(B)	4	1	3	2
(C)	4	2	3	1
(D)	3	1	4	2

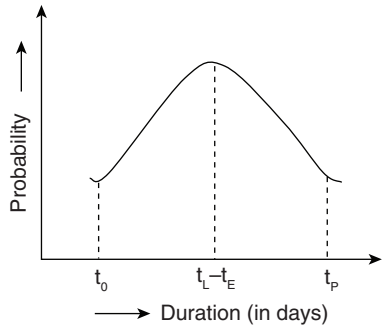
Answer Keys

1. C	**2.** A	**3.** B	**4.** D	**5.** A	**6.** D	**7.** C	**8.** C	**9.** B	**10.** C
11. B	**12.** C	**13.** C	**14.** D	**15.** B	**16.** D	**17.** C	**18.** B	**19.** B	**20.** A
21. B	**22.** C	**23.** B	**24.** D	**25.** D	**26.** A	**27.** B	**28.** C	**29.** C	**30.** D

Hints and Explanations

1. Beta distribution Choice (C)

2.

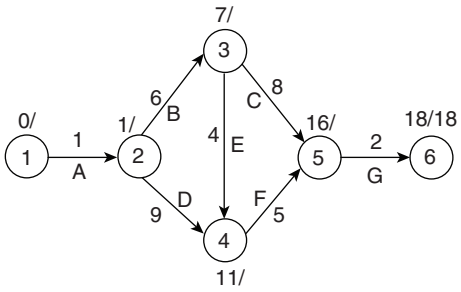


t_E = Expected time
So, 50% Choice (A)

3. M10 – 1:3:6
M15 – 1:2:4
M20 – 1:1.5:3 Choice (B)

4. Negative slacks are occur when there is a deficiency in available resources. Choice (D)

5.



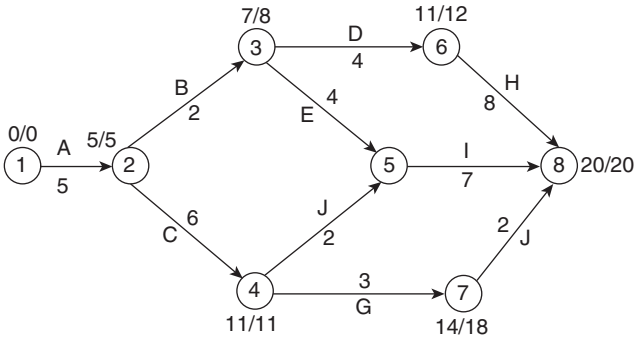
To find the duration of project, forward computation is enough. No need of backward computation of durations.
So, total duration of the project is 18 days. Choice (A)

6. To start one particular activity, the preceding activities must get completed. So to start an activity *F*, both *C* and *D* activities are need to get completed. Choice (D)

11. To make 1m³ of wet concrete, 1.5 m³ of dry concrete is required.
Volume of *C.A* = proportion of *C*. *A* × 1.5 m³
$= \frac{4}{7} \times 1.5 = 0.857 m^3$ Choice (B)

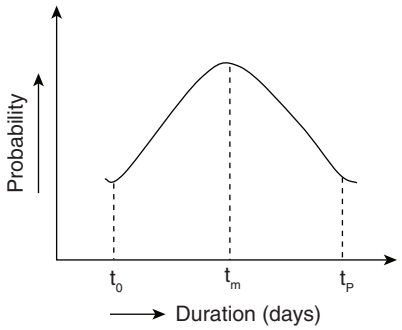
12. Correct sequence is:
2 -1 -4 -3 – 5 – 9 – 8 – 7 – 6 Choice(C)

13.



Critical path : 1 – 2 - 4 – 5 – 8 Choice (C)

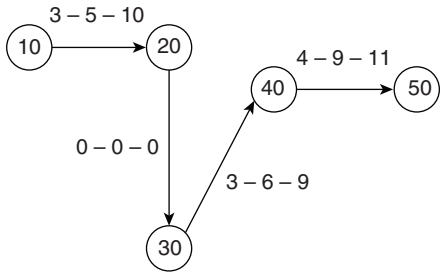
14.



$$t_e = \frac{t_o + 4t_m + t_p}{6} \frac{t_o + 4_{tm} + t_p}{6} = \frac{4 + 4(8) + 12}{6} = 8 \text{ days}$$

$\therefore$ Expected time = 8days Choice (D)

15.



$$t_e = \frac{t_0 + 4t_m + t_p}{6}$$

Expected time $t_e = \left(\frac{3+20+10}{6}\right) + \left(\frac{3+24+9}{6}\right) + \left(\frac{4+36+11}{6}\right) = \frac{120}{6} = 20 \text{days}$

variance $\sigma^2 = \left(\frac{t_p - t_o}{6}\right)^2$

$S.D = \sqrt{\left(\frac{7}{6}\right)^2 + \left(\frac{6}{6}\right)^2 + \left(\frac{7}{6}\right)^2} = 1.93$ Choice (B)

16. A – 4, B – 3, C – 2, D – 1 Choice (D)

17. 1 – c, 2 – c, 3 – a, 4 – b Choice (C)

18. Columns retaining walls - 75 -150mm
Mass concrete – 25 -50mm
Vibrated concrete – 12 -25mm Choice (B)

19. Proportion of *F.A* in

$= \frac{\text{F.M of C.A-Desired F.M}}{\text{Desired F.M-F.M of C.A}} \times 100$

Proportion of $F.A = \frac{7.6 - 6.4}{6.4 - 2.78} \times 100 = 33.33\%$

Choice (B)

20. Cube strength > Cylinder strength > Modulus of rupture > Split tensile Strength Choice (A)

21. Nominal size of brick is 19 × 9 × 9cm
With mortar in brick masonry, size = 20 × 10 × 10cm
∴ Volume of one brick in Masonry
$= 0.2 \times 0.1 \times 0.1\ m^3$
$= 2 \times 10^{-3}\ m^3$
For $1m^3$; Number of bricks required is

$= \frac{1}{2 \times 10^{-3}} = 500$ Choice (B)

23. Mean dimension $= \frac{50 + 40}{2} = 45mm$

Slot for flakiness index $= \frac{3}{5} \times 45 = 27mm$ Choice (B)

27. Given, $T_E^i = 5$; $T_E^j = 24$, $T_L^i = 9$, $T_L^i = 29$ and $t^{ij} = 6$

Total float = (LFT – EST) – Duration

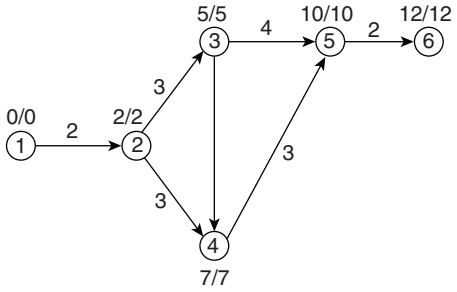
$= T_L^j - T_E^i - t^{ij} = (29 - 5) - 6 = 18$

Free float $= T_E^j - T_E^i - T^{ij}$

Free float = (24 – 5) – 6 = 13
Interfering float = Total float – Free float = 18 – 13 = 5
Independent float $= \left(T_E^i - T_L^i\right) - t^{ij}$

$= 24 - 9 - 6 = 9$ Choice (B)

29.



For an activity 2 – 4,
Total float = (7 – 2) – 3 = 2
For an activity 3 – 5,
Total float = (10 – 5) – 4 = 1 Choice (C)