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PTQ

Prelims Through Questions

for

ESE 2021

Civil Engineering

Day 9 of 11

Q.361 - Q.410

(Out of 500 Questions)

Building Materials + CPM-PERT

Building Materials + CPM-PERT

Q.361 Consider the following statements:

1. Light weight concrete is economical, has lower thermal expansion and shows lesser corrosion as compared to normal concrete.
2. Precast concrete is prepared at site of work, thereby achieving better technical control and accuracy.

Which of the above statement(s) is(are) CORRECT?

(a) 1 only (b) 2 only

(c) Both 1 and 2 (d) Neither 1 nor 2

361. (d)

Precast concrete is made in casting yards away from site of work.

Q.362 Consider the following statements about Bogue's compound:

1. C_3S enables clinker easy to grind, increases resistance to freezing and thawing.
2. C_2S hydrates and hardens slowly and imparts resistance to chemical attack.

Which of the above statements are CORRECT?

(a) 1 Only (b) 2 Only

(c) Both 1 and 2 (d) Neither 1 nor 2

362. (c)

Q.363 Which of the following defect is caused by vapourization of entrapped moisture or solvents in a painted surface?

(a) Saponification (b) Blistering

(c) Blooming (d) Cissing

363. (b)

Q.364 Consider the following statements regarding determination of moisture content of timber:

1. The sample of timber is taken in the form of pieces having dimensions of 50 mm × 50 mm × 25 mm.
2. It is dried in an oven at a temperature of 103°C ± 2°C.
3. The weight of test piece in the oven is regularly observed till the variation in last two consecutive observations does not exceed 0.002 gm.

Which of the above statement(s) is(are) CORRECT?

(a) 2 only (b) 3 only

(c) 1 and 2 (d) All of these

364. (d)

Q.365 Consider the following statements regarding 'setting of cement' :

1. Low-heat cement sets faster than OPC.
2. Final setting time decides the strength of cement.

3. Initial setting time of Portland Pozzolana cement is about 30 minutes.
4. Air-induced setting is observed when cement stored under damp conditions.
5. Addition of gypsum retards the setting time.

Which of the above statements are CORRECT?

(a) 1, 2 and 3 (b) 2 and 4
(c) 3, 4 and 5 (d) 2, 3 and 5

365. (c)

Low heat cement sets slower than OPC. Setting time has no relation with strength of cement. So, option (c) is correct.

Q.366 Consider the following statements:

Ultrasonic pulse velocity test is

1. used to measure the strength of wet concrete
2. used to obtain estimate of concrete strength of finished concrete elements
3. a non-destructive test

Which of the above statements are CORRECT?

(a) 1, 2 and 3 (b) 1 and 3
(c) 2 and 3 (d) 1 and 2

366. (c)

Q.367 Consider the following statements about fat lime:

1. It slakes vigorously and its volume is increased to about 2 to $2\frac{1}{2}$ times the volume of quicklime.
2. It is prepared by calcining comparatively pure carbonate of lime which is composed of about 95% of calcium oxide.
3. It has low degree of plasticity.
4. It sets rapidly in presence of air.

Which of the above statements are CORRECT?

(a) 1, 2 and 4 (b) 2 and 3
(c) 3 and 4 (d) 1 and 2

367. (d)

Fat lime has high degree of plasticity and sets slowly in presence of air.

Q.368 Consider the following statements about air entraining admixture:

1. It increases resistance to chemical attack.
2. It provides high resistance to freezing and thawing.
3. It decreases the strength of concrete.
4. It helps in modifying the property of concrete like plasticity, workability, bleeding, segregation, etc.

Which of the above statements are CORRECT?

(a) 1 and 4 (b) 2 and 4
(c) 1, 2 and 3 (d) All of these

368. (d)

Q.369 Consider the following statements regarding bricks:

1. The high duty fire-clays can resist temperature range of 1482°C to 1648°C.
2. Chromite bricks are unaffected by acidic or basic actions.
3. A brick moulded with double bullnose on end is known as a cownose.

Which of the above statement(s) is(are) CORRECT?

(a) 1 and 2 (b) 3 only
(c) 2 and 3 (d) 1, 2 and 3

369. (d)

Q.370 Consider the following tests:

1. Transverse strength test
2. Water absorption test
3. Impact test
4. Breaking strength test

Which of the above are relevant to testing of tiles?

(a) 1, 2 and 3 only (b) 1, 2 and 4 only
(c) 3 and 4 only (d) 1, 2, 3 and 4

370. (d)

Q.371 Match **List-I** with **List-II** and select the correct answer using the codes given below the lists:

List-I	**List-II**
A. Excess lime	**1.** causes deformation of bricks
B. Iron pyrites	**2.** weak and porous bricks are obtained
C. Pebbles or stones	**3.** causes efflorescence
D. Salt	**4.** crystallize and split the brick

Codes:

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

371. (a)

Excess lime cause deformation of bricks, Pebbles makes brick weak and porous after burning in kiln.

Iron pyrites crystallize and split the brick.

Q.372 Consider the following statements:

Aluminium is being increasingly used for structural purpose because

1. its modulus of elasticity is double that of steel
2. its coefficient of thermal expansion is half that of steel
3. it requires less maintenance
4. the strength to unit weight ratio of aluminium is high

Which of these statements are CORRECT?

(a) 1 and 4 (b) 2 and 4
(c) 1, 2 and 3 (d) 3 and 4

372. (d)

Aluminium has greater strength to unit weight ratio compared to steel and therefore it is being increasingly used for structural purpose.

The modulus of elasticity of aluminium is about one third that of steel while its coefficient of thermal expansion is double that of steel.

Q.373 Which of the following are major disadvantages of improper curing of concrete?

1. The rate of carbonation increases.
2. The frost and weathering resistance are decreased.
3. The chances of ingress of chlorides and atmospheric chemicals are very high.
4. The durability increases due to higher permeability.

(a) 2 and 4 (b) 1 and 3
(c) 1, 2 and 3 (d) 2, 3 and 4

373. (c)

Q.374 Seasoning of timber essentially involves

(a) strengthening of cells in timber
(b) reducing the moisture content to a level below its fibre saturation point
(c) facilitating equal shrinkage in all the directions so as to prevent warping
(d) preventing cracking due to defects and shakes

374. (b)

Seasoning of timber involves reducing the moisture content to a level below its fibre saturation point.

Q.375 Consider the following statements regarding high alumina cement:

1. It allows more time for mixing and placing operations.
2. It cannot withstand high temperatures.
3. It is not affected by frost action.

Which of the above statements are CORRECT?

(a) 1 and 2 (b) 2 and 3
(c) 1 and 3 (d) All of these

375. (c)

Q.376 Match **List-I** with **List-II** and select the correct answer using the codes given below the lists:

List-I	**List-II**
A. Bull-nosed brick	**1.** For arches over doors and windows
B. Plinth bricks	**2.** On top of parapet walls
C. Coping bricks	**3.** For use in plinths
D. Voussoirs	**4.** For rounding off sharp corners

Codes:

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

376. (a)

Q.377 The fineness modulus of fine aggregate is 2.8 and of coarse aggregate is 7.5 and the desired fineness modulus of mixed aggregate is 6. What is the amount of fine aggregate to be mixed with one part of coarse aggregate?

(a) 45.8% (b) 43.3%
(c) 47.7% (d) 46.8%

377. (d)

Let $\frac{\text{Fine aggregate}}{\text{Coarse aggregate}} = x$

So, combined aggregate/coarse ratio will be $(1 + x)$

$\Rightarrow \quad (1 + x)6 = 1 \times 7.5 + x \times 2.8$

$\Rightarrow \quad x = \frac{7.5 - 6}{6 - 2.8} = 0.468 \text{ or } 46.8\%$

Q.378 The workability of concrete is assessed through:

1. Slump test
2. Compaction factor test
3. Setting time of cement
4. Le-Chatelier's apparatus

(a) 1 and 2 (b) 2 and 3
(c) 3 and 4 (d) 1 and 4

378. (a)

Q.379 Which of the following defects in timber result in reddish or yellowish stains indicating the beginning of decay in timber because of bad ventilation during storage?

(a) Wet rot (b) Dry rot
(c) Foxiness (d) Upset

379. (b)

Q.380 The mortar used for masonry construction are classified based on strength as per IS 2250 and IS 1905 according to their designations L_1, L_2, H_1, H_2, M_1, M_2. The correct sequence of increasing order of their strength is

(a) $L_1, L_2, H_1, H_2, M_1, M_2$ (b) $L_2, L_1, M_2, M_1, H_2, H_1$
(c) $M_1, M_2, H_1, H_2, L_1, L_2$ (d) $L_2, L_1, M_1, M_2, H_1, H_2$

380. (b)

According to IS 1905,

Grade	Strength (in MPa)
H_1	10
H_2	7.5 - 6
M_1	5 - 3
M_2	3 - 2
L_1	0.7
L_2	0.5

Q.381 Match **List-I** with **List-II** and select the correct answer using the codes given below the lists:

List-I	**List-II**
A. Stretcher bond	**1.** The bond containing bricks laid with headers towards the face of the wall
B. Header bond	**2.** The bond containing alternate courses of stretchers and headers
C. English bond	**3.** The bond containing bricks laid with their lengths in the longitudinal direction of the wall
D. Double Flemish bond	**4.** The bond containing alternate stretchers and headers in each course

Codes:

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

381. (a)

Q.382 Consider the following statements:

Sand in mortar is needed for

1. decreasing the quantity of cement
2. reducing shrinkage
3. decreasing the surface area of the binding material
4. increasing the strength

Correct statements are

(a) 2, 3 and 4 (b) 1, 2 and 3
(c) 1, 3 and 4 (d) 1, 2 and 4

382. (d)

Sand in mortar is added to reduce the shrinkage, decrease the quantity of cement used, increasing the surface area.

Q.383 Match **List-I** (Type of Cement) with **List-II** (Characteristics) and select the correct answer using the codes given below the lists:

List-I	**List-II**
A. Ordinary portland cement	**1.** The percentage of C_3S is maximum and is of the order of 50%
B. Rapid hardening cement	**2.** The percentage of C_2S and C_3S are the same and of order of 40%
C. Low heat cement	**3.** Reacts with silica during burring and causes particles to unite together and development of strength
D. Sulphate resistant cement	**4.** Suitable for large mass concrete works such as dams, large raft foundations etc.

Codes:

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

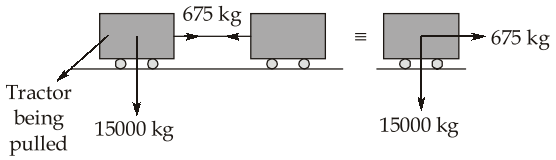
383. (b)

C_3S is contribute to the early strength of cement and for rapid hardening C_3S content is increased. To make cement sulphate resistant, C_3S content is reduced, moreover both C_3S and C_2S are present in cement in around 40%.

Q.384 A four-wheel tractor whose operating weight is 15,000 kg is pulled along a level haul road at a uniform speed by another tractor. The average tension in the tow cable is 675 kg. The rolling resistance of the haul road is

(a) 25 kg/t (b) 35 kg/t
(c) 45 kg/t (d) 55 kg/t

384. (c)

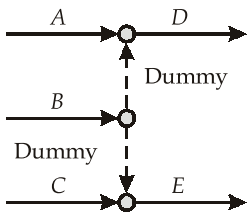


$$675 = \mu(15000)$$

$$\Rightarrow \quad \mu = \frac{675}{15000}\text{ kg/kg} = \frac{675}{15}\text{ kg/ton}$$

$$= 45\text{ kg/ton}$$

Q.385 Consider the following network



Consider following statements with respect to above network:

1. Activity *A* controls activity *D*, *E*.
2. Activity *B* controls *D* and E.
3. Activity *E* depends on *C*.

Which of the above statements are CORRECT?

(a) 1 and 2 (b) 2 and 3
(c) 1 and 3 (d) All of these

385. (b)

Note that apart from *C*, *E* also depends on *B*.

Q.386 The project is expected to take 15 months along critical path, having standard deviation of 3 months. Then probability of completion of project within 12 months is
[Take $P(z = 1) = 84.13\%$, $P(z = 0) = 50\%$]
(a) 50% (b) 84.13%
(c) 15.87% (d) 34.13%

386. (c)
Given; $T_E = 15$ months, $\sigma = 3$ months, $T_s = 12$ months

$$\therefore \quad z = \frac{T_S - T_E}{\sigma} = \frac{12 - 15}{3} = -1$$

$\therefore$ For $z = -1$;
Probability = 100% – 84.13% = 15.87%

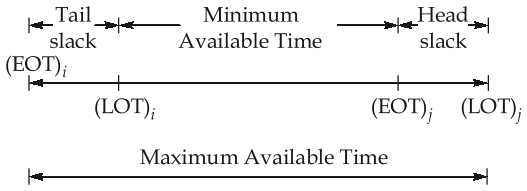
Q.387 If the scope of work is well defined with all its drawings, specifications, quantities and estimates, which of the following type of contract would be most preferred?
(a) EPC contract (b) Percentage rate contract
(c) Item rate contract (d) Lump sum contract

387. (c)

Q.388 Consider the following pairs:
1. Difference between total float and free float : **Interfering float**
2. Sum of independent float and tail slack : **Free float**
3. Sum of independent float, tail slack and interfering float : **Total float**

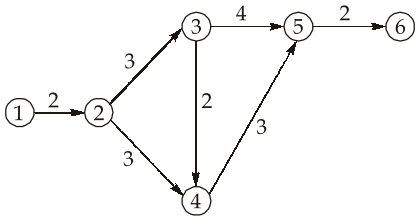
Which of these pairs are correctly matched?
(a) 1, 2 and 3 (b) 1 and 2
(c) 2 and 3 (d) 1 and 3

388. (a)
Time scale for an activity:



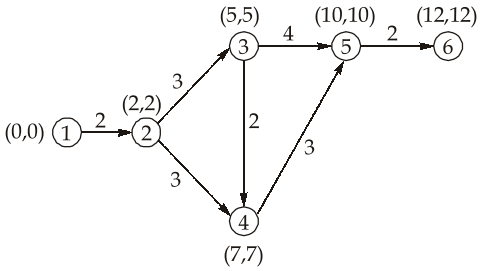
Independent Float (*IF*) is the excess of minimum available time over activity time.
Free Float (*FF*) is the excess of available time over the activity time when all jobs start as early as possible.
So, $FF = IF$ + Tail slack
Interfering Float = $TF - FF$ = Head slack
$\therefore$ TF = Int. $F + FF$ = Int. $F + IF$ + Tail slack
Or $TF = IF$ + Head slack + Tail slack

Q.389 In the network as shown in figure, activity duration (in days) is shown on the arrows respectively for each activity. The total float for activity 2-4 will be



(a) 3 days (b) 2 days
(c) 1 day (d) Zero

389. (b)



$$T_F = \text{LFT} - \text{EFT} = 7 - 5 = 2 \text{ days}$$

Q.390 A scaffolding is designed for the load of 3t. The probability that the load on scaffolding will exceed 3t is 0.2. The probability that the strength of scaffolding will be more than 3t is 0.7. Then probability of failure of scaffolding is

(a) 0.14 (b) 0.7
(c) 0.03 (d) 0.06

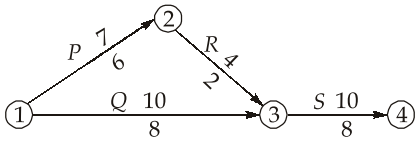
390. (d)

Scaffolding will fail when load on scaffolding exceeds 3t and strength of scaffolding is less than –3t.

$$\therefore \quad P = 0.2 \times (1 - 0.7) = 0.06$$

Q.391 Consider the following network logic and find which activity should be crashed first and by how many days?

i node	*j* node	Activity	Duration (days)		Direct cost (in ₹)	
			Normal	Crash	Normal	Crash
1	2	P	7	6	250	350
1	3	Q	10	8	350	500
2	3	R	4	2	300	400
3	4	S	10	8	700	950



(a) S by 2 days (b) R by 2 days
(c) S by 1 day (d) R by 1 day

391. (d)

$$\text{Cost slope of } P = ₹100$$

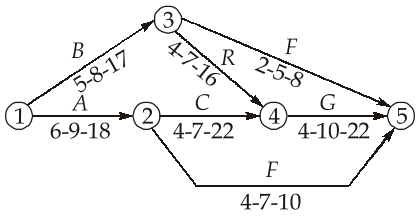
$$\text{Cost slope of } Q = \frac{150}{2} = ₹75 / \text{day}$$

$$\text{Cost slope of } R = \frac{100}{2} = ₹50 / \text{day}$$

$$\text{Cost slope of } S = \frac{250}{2} = ₹125 / \text{day}$$

Critical path is $1 \to 2 \to 3 \to 4$ (21 days)
But $1 \to 3 \to 4$ (20 days)
So R should be crashed first by 1 day only.

Q.392 The probability representative Z-value for the project to be completed in 35 days is



(a) 0.67 (b) 1.07
(c) 2.28 (d) 1.52

392. (b)

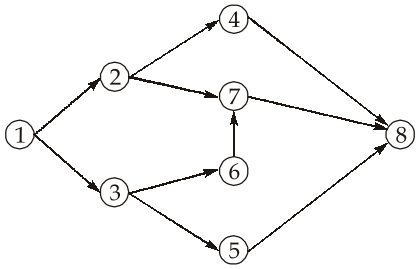
Critical path is A-C-G or 1-2-4-5

Project duration, $T_E = 30$ days

$$\sigma = \sqrt{4+9+9} = \sqrt{22}$$

So, $$Z = \frac{T_S - T_E}{\sigma} = \frac{35-30}{\sqrt{22}} = \frac{5}{\sqrt{22}} = 1.07$$

Q.393 Number of errors in the network shown below is



(a) 1 (b) 2
(c) 3 (d) No error

393. (d)

Q.394 Earliest finish of an activity is always
(a) greater than earliest event time of the following node.
(b) less than earliest event time of the following node.
(c) less than or equal to earliest event time of the following node.
(d) greater than or equal to earliest event time of the following node.

394. (c)

Q.395 The constraint in case of resource smoothening operation would be
(a) resources
(b) project duration time
(c) both resources and project duration time
(d) none of the above

395. (b)

Q.396 Match **List-I** (Factor) with **List-II** (Expressions) and select the correct answer using the codes given below the lists:

List-I	**List-II**
A. CRF	**1.** $\frac{(1+i)^n-1}{i(1+i)^n}$
B. UPPWF	**2.** $\frac{i(1+i)^n}{(1+i)^n-1}$
C. UPCAF	**3.** $\frac{i}{(1+i)^n-1}$
D. SFF	**4.** $\frac{(1+i)^n-1}{i}$

Codes:

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

396. (c)

Q.397 A machine costs ₹20000 and its useful life is 8 years. The money is borrowed at 8% interest per annum. The capital recovery factor at 8% interest per annum for 8 years is 0.174. The annual equipment cost of the machine will be
(a) ₹1740 (b) ₹3480
(c) ₹5220 (d) ₹6960

397. (b)
Annual equipment cost =20000 × 0.174 = ₹3480

Q.398 The probability distribution taken to represent the time of completion in PERT analysis is

(a) Normal distribution (b) Beta distribution

(c) Gamma distribution (d) None of these

398. (a)

The distribution curve for the time taken to complete each activity of a project resembles a β-distribution curve and the distribution curve for the time taken to complete entire project (consisting of several activities) in general resembles a normal distribution curve.

Q.399 *A*, *B*, *C*, *D* and *E* are the five activities along the unique critical path of an AOA network of activities. Their characteristics are as under:

Activity	A	B	C	D	E
Expected duration, days	7	6	11	14	5
Standard deviation, days	2	2	3	4	1

What is the possible range of project duration (in days)?

(a) 31.2 to 54.8 (b) 28.1 to 57.9

(c) 25.6 to 60.4 (d) 24.6 to 61.4

399. (c)

Project duration, $T = 7 + 6 + 11 + 14 + 5$

$= 43$ days

Variance $= 2^2 + 2^2 + 3^2 + 4^2 + 1^2 = 34$

Standard deviation $\sigma = \sqrt{34} = 5.8$ days

Range of project duration = (Minimum time, Maximum time)

Minimum time $= T - 3\sigma = 25.6$ days

Maximum time $= T + 3\sigma = 60.4$ days

Q.400 Match **List-I** (Error) with **List-II** (Description) and select the correct answer using the codes given below the lists:

List-I

P. Looping

Q. Dangling

R. Wagon wheel

List-II

L. Network shows the precedence relationship that does not exist actually

M. Event occurs more than once

N. Network has more than one finished event

Codes:

	P	Q	R
(a)	M	L	N
(b)	N	M	L
(c)	M	N	L
(d)	N	L	M

400. (c)

Q.401 Consider the following statements:

Crashing a project in terms of its duration would result in

1. an increase in the indirect cost.
2. a decrease in the indirect cost.

3. a decrease in the direct cost.
4. an increase in the direct cost.

Which of the above statements are CORRECT?

(a) 1 and 4 (b) 2 and 3
(c) 1 and 3 (d) 2 and 4

401. (d)

Q.402 A four wheel tractor weighing 18000 kg has weight distribution between the front and rear wheels of 40% and 60% respectively. It is operating on a level road whose rolling resistance is 45 kg/t. What is the maximum effective rimpull of the tractor if coefficient of friction between road surface and tyre is 0.65?

(a) 6210 kg (b) 5820 kg
(c) 7282 kg (d) 7020 kg

402. (a)

$$\text{Total rimpull} = \mu \times W$$

$$= 0.65\left(\frac{60}{100}\times 18000\right)\text{kg}$$

$$= 7020 \text{ kg}$$

$$\text{Rolling resistance} = 45 \text{ kg/t}$$

$$\therefore \text{Total rolling resistance} = 45 \times 18 = 810 \text{ kg}$$

$$\therefore \text{Net rimpull} = 7020 - 810 = 6210 \text{ kg}$$

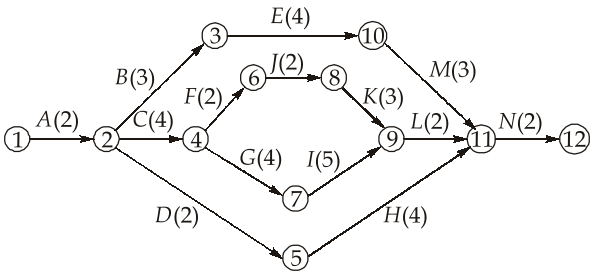
Q.403 Which of the following statements are correct regarding item rate contract?

1. It ensures detailed analysis of cost.
2. Changes in drawing and quantities of individual item can be made as per requirement.
3. There is no urgency of providing detailed drawing at the time of awarding of contract.

(a) 1 and 2 (b) 2 and 3
(c) 1 and 3 (d) All of the above

403. (d)

Q.404 The project consist of 14 activities, *A* to *N* the duration of these activities are shown in brackets on the network diagram. The latest finish time (in days) for activity 6-8 is



(a) 14 (b) 12
(c) 10 (d) 8

404. (b)

LFT for activity 6-8 is 12 days as time required for project completion is 19 days and $1 \rightarrow 2 \rightarrow 4 \rightarrow 7 \rightarrow 9 \rightarrow 11 \rightarrow 12$ is the longest path.

Q.405 Consider the following statements:

1. Free float affects only the succeeding activity.
2. Independent float affects only the particular concerned activity.
3. Total float affects both successive and preceding activity.

Which of the above statements are CORRECT?

(a) 1 and 2 (b) 2 and 3
(c) 1 and 3 (d) All of the above

405. (b)

Free float affects only preceding activity.

Q.406 A 1.5 m^3 rehandling type bucket is used to transfer sand from a stock pile into a hopper, 8 m above the ground. The angle of swing will average 90° with cycle time of 30 seconds. The average speed of hoist line is 45 m/min. The probable output per hour is

(a) 180 m^3 (b) 135 m^3
(c) 120 m^3 (d) 100 m^3

406. (b)

Maximum number of cycles per hour = $\frac{60 \times 60}{30} = 120$

Maximum volume per hour= $120 \times 1.5 = 180\ m^3$

If unit operates 45 m/min, then probable output per hour = $\frac{180 \times 45}{60} = 135\ m^3$

Q.407 Match **List-I** with **List-II** and select the correct answer using the codes given below the lists:

List-I	**List-II**
A. Static steel drum roller	**1.** Coarse grained soil.
B. Vibratory steel drum roller	**2.** Bituminous bearing coarse in a flexible pavement.
C. Vibrating padfoot roller	**3.** Medium to high plasticity fine grained soil.
D. Sheepfoot roller	**4.** Low to medium plasticity fine grained soil.

Codes:

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

407. (c)

Direction: The following items consists of two statements, one labelled as **Statement (I)** and the other labelled as **Statement (II)**. You have to examine these two statements carefully and select your answers to these items using the codes given below:

Codes:

(a) Both Statement (I) and Statement (II) are true and Statement (II) is the correct explanation of Statement (I).

(b) Both Statement (I) and Statement (II) are true but Statement (II) is not a correct explanation of Statement (I).

(c) Statement (I) is true but Statement (II) is false.

(d) Statement (I) is false but Statement (II) is true.

Q.408 Statement (I) : Glass, used as sheets in buildings, is a crystalline solid and is transparent.
Statement (II) : Glass is obtained by the fusion of silicates of sodium and calcium, both of which are crystalline in structure.

Q.408 (d)

Glass is non-crystalline amorphous solid that is often transparent.

Q.409 Statement (I): The hoe is very advantageous in digging trenches and basements.
Statement (II): In a hoe, the digging action results from the drag of the bucket.

409. (a)

Q.410 Statement (I): Crashing of construction duration helps better optimal resource utilization.
Statement (II): Crashing of activities in a construction project network tends to increase the number of critical activities.

410. (d)

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