ZONE TECH

Best Institute For Assistant & Junior Engineer

Civil Engineering

Test - 7

RSSB (JE) Diploma Test Series - 2024

Answer key & Detailed Solution

Test ID : 907 Date:- 10/11/2024

Duration : 80 Minutes Maximum Marks : 80

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

For small opening up to 0.5 m^2 area, no deduction in plastering is made. For the opening of size 0.5 m^2 to 3 m^2 area, the deduction is made on one face of the wall. For openings of size above 3 m^2, the deduction is made on both faces of the wall, but the area of the sill, jamb, and soffits of the opening is added.

32. (b)

Mid ordinate and Average ordinate methods are used with the assumption that the boundaries between the extremities of the ordinates are straight lines.

Trapezoidal method is based on the assumption that the figures are trapezoids. The method is more accurate than the above two methods.

Simpson's method assumes that the short lengths of the boundaries between the ordinates are parabolic arcs. This method is more useful when the boundary line departs considerably from the straight line. The result obtained by use of Simpson's method in all cases are more accurate.

33. (a)

The carpet area of a building is the useful area or livable area or lettable area. This is the total floor area minus the circulation area (verandahs, corridors, passages, lifts, entrance hall, etc.)

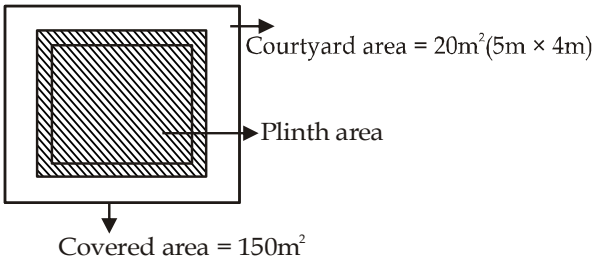
34. (c)

Given,

Covered area = 150m²

Courtyard area = 5m × 4m = 20 m²

Plinth area rate = 1250/m²



Plinth area = Covered area – Courtyard area

= 150 – 20

= 130 m²

Cost = Plinth area × Rate/m²

Total cost of building = 1250 × 130

= 1,62,500 Rs.

35. (d)

1. **Mid section formula:** In this formula, the mean depth is to be calculated. First by averaging the depths of two consecutive sections. From the mean depth the area of mid-section is to be worked out and volume of earthwork to be computed by multiplying the area of mid-section by the distance between the two original sections.
2. **Trapezoidal Formula:**

   Volume, $V = \frac{d}{2}$[First area section + Last area section + 2(sum of other areas)]
3. **Prisomoidal Formula:**

   $V = \frac{d}{3}$ [First area section + Last area section + 4(sum of even areas) + 2(sum of odd area)]

All above can be used for earthwork estimation if highway has a uniform gradient.

36. (a)

In the case of works that require some special types of equipment, an amount of 1-2 percent of the estimated cost is given. While preparing a detailed estimate, it is also important to select a suitable site of work to reduce damage during the loading and unloading of materials.

37. (a)

A sinking fund is a fund containing money set aside or saved to pay off a debt or bond.

Annual installment for sinking fund or Annual sinking fund = $I = \frac{S.i}{(1+i)^n - 1}$

Where,

S = Sinking fund,

i = Rate of Interest,

n = Useful time

38. (b)

Four Methods for calculating depreciation:

(i) Straight-line Method

(ii) Constant percentage method

(iii) Sinking Fund Method

(iv) Quantity Survey Method

In the Straight line method, it is assumed that the property losses its value by the same amount every year. A fixed amount of the original cost is deducted every year so that at the end of the utility period, only the scrap value is left.

In the cost percentage method, it is assumed that the property will lose its value by a constant percentage of its value at the beginning of every year.

39. (a)

Salvage value: It is the value of the property at the end of the utility period without being dismantled.

Scrap value: It is the value of the property at the end of the utility period after being dismantled.

Market value: It is the value of property or building if it is put in the open market for sale.

Book value: The amount of any property after necessary depreciation.

Book value = Original cost - depreciation.

40. (b)

The art of assessing the present fair value of a property at a stated time is known as valuation.

Valuation of a building depends on the type of the building, its structure, and durability, on the situation, size, shape, frontage, the width of roadways, the quality of materials used in the construction, and present-day prices of materials.

41. (d)

Cost of machine = 10000

Useful life = 10 years

Salvage value = 1000

$$\text{Depreciation per year} = \frac{10000 - 1000}{10} = 900$$

Depreciation upto 5 years = 900 × 5 = 4500

Depreciated cost = 10000 – 4500 = 5500

42. (a)

Size of a modular brick = 190 × 90 × 90 mm^3

Mortar thickness = 10 mm

Size of brick with mortar.

Length ⇒ 0.19 + 0.01 = 0.20

Width ⇒ 0.09 + 0.01 = 0.10

Height ⇒ 0.09 + 0.01 = 0.10

Calculation:

Valume of brick with mortar = 0.2 × 0.1 × 0.1 = 0.002 m^3

∴ **No. of bricks** in 10 m^3 = 10/0.002 = 5000 NoS.

Volume of 5000 bricks without mortar = 5000 × 0.19 × 0.09 × 0.09 = 7.695 m^3

Volume of mortar = 10 – 7.695 = 2.305 m^3

Dry volume of mortar = 1.33 × 2.305 = 3.06 m^3

Given mortar ratio = 1 : 6

∴ **Volume of cement** = (3 × 1)/(1 + 6) = 3/7 m^3

43. (c)

Weight of standard brick = 3.2 kg

1 tonne = 1000 kg

8 tonne = 8000 kg

now, Total weight we can carry = 8000 kg

weight of 1 brick = 3.2 kg

Total no. of brick = total weight / weight of 1 brick

no. of brick = 8000/3.2

no. of brick = 2500

44. (d)

As per I.S. 1200 of 1974, the measurement of the item of earthwork shall be carried out as follows:

1. **Surface Excavation:** Excavation exceeding 1.5 m in width as well as 10 m^2 on plan but not exceeding 300 mm in depth shall be described as 'Surface Excavation' and measured in Square meters.
2. **Excavation over the area:** Excavation exceeding 1.5 m in width as well as 10 m^2 in the plan, and 300 mm in depth shall be described as 'Excavation over area' and measured in cubic meters.

45. (b)

Drip course, string course, and water coping are measured in running meter or m.

The units of measurements for civil engineering works are mainly categorized for their nature, shape, and size and for making payments to the contractor. The principle of units of measurements normally consists the following:

(a) Single units work like doors, windows, trusses, etc., are expressed in numbers.

(b) Works consist of linear measurements involve length like cornice, fencing, handrail, bands of specified width, etc., are expressed in running meters (m).

(c) Works consist of areal surface measurements involve area like plastering, whitewashing, partitions of specified thickness etc., and are expressed in square meters (m^2)

(d) Works consist of cubical contents which involve volume like earthwork, cement concrete, Masonry, etc. are expressed in Cubic meters (m^3).

46. (b)

A document containing a detailed description of all the items of work (but their quantities are not mentioned) together with their current rates is called schedule of rates.

A tender is an offer to execute some specified work or to supply some specified article at certain rates.

The main function of an abstract of the estimate are as follows:

The total estimated cost and the different items of works are required to complete a project can be known.

This is the basis on which bills are prepared for payment.

47. (b)

S. No.	Description of work	Coefficient of painting (for Each side)
1.	Flush doors	1.20
2.	Panelled or framed and braced doors, windows, etc.	1.30
3.	Fully glassed or gauged doors, windows, etc.	0.80
4.	Fully Venetioned or louvered doors, windows, etc.	1.80
5.	Collapsible gates	1.50

Hence, For both side, it should be 2 x 1.2 = 2.4

48. (d)

Dimensions shall be measured nearest to a cm except for the thickness of slab, sectional dimension of column and beam which shall be measured correct to 0.5 cm.

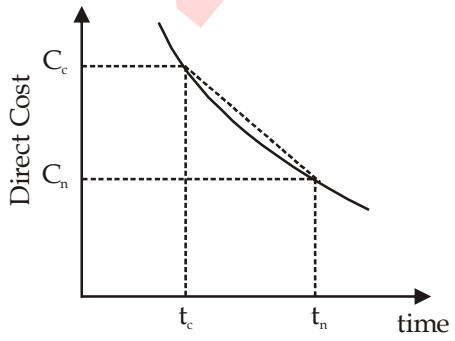
49. (a)

Work charged establishment charges include temporary establishments as are employed for the execution of the intermediate technical supervision or departmental stores and machinery in connection with a specific work. An amount of 2% to 2.5% is sanctioned.

50. (a)

Cost slope:-

It is the slope of the direct cost curve. Assuming it to be a straight line. It signifies the increase in direct cost per unit decrease in Activity duration.



$$\text{Cost slope} = \frac{C_c - C_n}{t_n - t_c}$$

where,

C_c = Crash cost
C_n = Normal cost
t_n = Normal time
t_c = Crash time

51. (c)

Derrick : Much like a crane, a derrick is used for moving materials vertically and horizontally, comprised of a hoisting mechanism and pulleys or sheaves to create a mechanical advantage to lift large loads.

Power shovel : It is a bucket-equipped machine usually powered by steam, diesel fuel, gasoline or electricity and used for digging and loading earth or fragmented rock and for mineral extraction

Dragline excavator : It is a heavy-duty excavator used in civil engineering and surface mining. It was invented in 1904.

52. (c)

Valuation is the art of assessing the present fair value of a property in terms of money based on certain facts and factors. The main purpose of valuation is following:

(i) For purchase of property
(ii) For sale of property
(iii) Tax fixation
(iv) Rent fixation
(v) Mortgage value
(vi) Assessment of wealth tax
(vii) Assessment of stamp fees
(viii) So assess compensatory amount in case government takes over the property.

53. (d)

For the analysis of rates, knowledge of following items is necessary:

- Specifications of works and materials about their quality, proportion, and construction methods
- Quantity of materials and their costs.
- Cost of labours and their wages.
- Location of work
- Conveyance charges.
- Overhead charges
- Profits of contractor, consultant, and other parties involved.

54. (c)

Center line method

In this method of estimation, the total center line length of walls in a building is first calculated, then the center line length is multiplied with the breadth and depth of the respective items to get the total quantity at a time.

Deductions

L Junction - There is no need to deduct from total centreline length.

T Junction - Half (1/2) breadth wall measurement should be deducted for a T junction.

Estimate be central line method is as follows:

= [(4+0.1+0.1)×2] + [(3+0.1+0.1)×2]

= [8.4] + [6.4] = 14.8 m

55. (c)

Explosive demolition is the preferred method for safely and efficiently demolishing larger structures and skyscrapers. When explosive are used for the demolition, it is known as Implosion.

It is also known as Controlled Blasting Demolition

56. (b)

The most accurate cost for a building project is arrived at through detailed estimate.

A detailed estimate should have documents such as report, specifications, drawings/plans, design charts and schedule of rates and is the most accurate method of estimating.

57. (d)

Book value: It is the amount shown in the account book after allowing necessary depreciations.

The Book Value of the property at a particular year is the original cost minus the amount of depreciation up to a previous year.

The Book Value depends upon the amount of depreciation allowed per year and will gradually increase year to year.

Book value = Original cost – Depreciation

Market value: The value of a property in an open market and it depends upon time.

Obsolescence: the value of any structure becomes less by it becoming out of date style, structural design, etc termed as obsolescence.

Scrap value: It is the value of dismantled materials for a building when its life is over. The scrap value of a building may be about 10% of its total cost of construction.

Salvage value: It is the value at the end of the utility period without being dismantled. It may be zero, positive and negative.

Distress value: Some time due to fear of war or riot the value of a property cannot fetch the full market value. Then this value of the property is called distress value.

58. (d)

Letter of Acceptance of Tender - Means the letter issued by the Company giving intimation to the Bidder that his Tender has been accepted in accordance with the provisions contained in that letter.

Priced Bill of Quantities - Means the bill of quantities duly priced with the accepted quoted rates of the contractor.

59. (b)

The capacity of Doing work by skilled labour in the form of quantity per day is called task or out turn work or Labour output.

	Particulars of Item	Qty. Unit per day
	Brickwork	
1.	Brickwork in Lime or Cement Mortar (Foundation & Plinth)	1.25 Cum per Mason
2.	Brickwork in Lime or Cement Mortar (Super structure)	1 Cum per Mason
3.	Brickwork in Mud Mortar (Foundation & Plinth)	1.5 Cum per Mason
4.	Brickwork in Mud Mortar (Super structure)	1.25 Cum per Mason
5.	Brick in Cement or lime mortars in arches	0.55 Cum per Mason
6.	Brick in Cement or lime mortars in Jack arches	0.55 Cum per Mason

60. (c)

Hold fasts for doors - The number of hold fasts required for a door depends on the size and weight of the door.

However, when the number of hold fasts is not specified, the usual number of hold fasts considered for a door is six.

61. (a)

The Measurement Book (MB) is a crucial document that records all the measurements taken during the construction project. It is maintained by the Assistant Engineer (A.E) in collaboration with the Junior Engineer (J.E) and the Contractor's Engineer (C.E).

The A.E is responsible for maintaining the MB throughout the entire project. They are in charge of recording all the measurements taken on site and ensuring that they are accurate. The A.E is also responsible for verifying the measurements taken by the J.E and the C.E to ensure that they are correct.

62. (d)

An annuity is a contract between you and an insurance company that requires the insurer to make payments to you, either immediately or in the future.

A mortgage is a loan used to purchase or maintain a home, plot of land, or other real estate. The borrower agrees to pay the lender over time, typically in a series of regular payments divided into principal and interest. The property then serves as collateral to secure the loan.

Amortization calculator

$$A = P\frac{i(1+i)^n}{(1+i)^n - 1}$$

A = Periodic payment amount

P = Amount of principal, net of initial payments

i = Periodic interest rate

n = Total number of payments

63. (a)

Measurement for grouting shall be made on basis of the **weight** of cement in grout actually forced into holes. Stone dust and other additions, if used, shall be measured separately in loose dry state before mixing and shall be measured by boxes of approved size and design.

64. (c)

Estimation can be done by various methods:

1. Centre line method
2. Long-wall/short wall method
3. Partly Centre Line and Partly Cross Wall method/thin wall and thick wall method

Centre line method: In this method, centre line of both long and short wall is determined which is further multiplied by the respective breadth and height.

Long wall and short wall method: In this method, wall lengths are measured separately i.e out to out for Long wall and in to in for short wall which is further multiplied by the respective breadth and height.

Partly Centre Line and Partly Cross Wall Method: This method is adopted when external (i.e., around the building) wall is of one thickness and the internal walls having different thicknesses. In such cases, centre line method is applied to external walls and long wall-short wall method is used to internal walls. It is also known as thin wall and thick wall method.

65. (d)

The area of an apartment that can be covered by a carpet or the net usable area is known as the carpet area. It does not include the external walls, terraces, common areas, lifts, corridors, utility ducts, Barsaties, staircase & Mumties, Entrance Hall & Porches, Stores in domestic building, kitchen & pantries.

66. (d)

67. (d)

Cross Sectional Area of 10 cm thick wall,

A = thickness × Height

$= 0.1 \times (0.160 + 0.150)$

$= 0.1 \times 0.31$

$A = 0.031\ m^2$

68. (b)

Grouting of cracks is measured in metre and only grouting is measured in sq.m.

69. (d)

$$\text{Capitalized value} = 20000 \times \frac{100}{5}$$

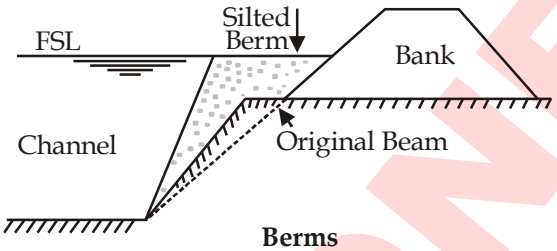
$$= 20000 \times 20$$

$$= 400000$$

70. (d)

S. No.	Particulars of items	Units of Measurement	Units of Payment
1.	Plastering-Cement or Lime Mortar (thickness and proportion specified)	sqm	per sqm
2.	Pointing	sqm	per sqm
3.	White washing, colour washing, cement wash (number of coats specified)	sqm	per sqm
4.	Distempering (number of coats specified)	sqm	per sqm
5.	Painting, varnishing (number of coats specified)	sqm	per sqm

71. (b)



Berms

Recommended berm width

Discharge in cumecs	Berm width in terms of depth of water, D
4.25	0.6 + 0.5 D
4.25 to 28	1.25 + 0.5 D
28 and above	$1.25+\frac{D}{28}+0.5\ D$

72. (c)

Bathroom sinks should be place at a surface height of between 30"-36" (76-91 cm) from the bathroom floor. Bathroom sink heights can vary, but it is important that the sink is not too low or too high.

73. (d)

A cleat in construction refers to a small, typically wooden, metal, or plastic, wedge-shaped device used to secure, fasten, or support various components in construction projects. Cleats are designed to provide stability and support, ensuring that structures remain secure and durable.

A bracket acts simultaneously outward, along the horizontal or top edge, and downward along the wall that supports the vertical.

A bolt is a type of fastener, usually made from metal, that commonly comprises a head at one end, a chamfer at the other, and a shaft characterised by an external helical ridge known as a 'thread'. Bolts are typically used to hold materials or objects together, or to position objects.

74. (a)

75. (c)

Duties of the Public Works department

The department is mainly entrusted with construction and maintenance of Roads, Bridges and Govt. buildings.

The department also acts as Technical Advisor to the State Government in these matters.

Initially, Irrigation, Public Health engineering were units of PWD.

Duties of the water resources department

Investigation and Planning of Major & Medium Irrigation Projects.

Hydrological analysis and design of Water Resources projects.

Ensure sustainable development of water resources of the state.

76. (c)

On an Average a Civil Contractor Earns a Profit of Minimum 10% to 15% of the Project Cost on any project.

With own machinery,manpower and finance he can make a profit of upto 30% to 50% depending upon the Nature of Work.

77. **(d)**

Unit weight of steel = 7850 kg/m^3

$$\text{Area of bar} = \frac{\pi}{4}\times(10)^2$$

Weight of steel bar per meter length

$$= 7850\times\frac{\pi}{4}\times(10)^2\times1$$
$$= 0.62 \text{ kg}$$

78. **(d)**

Earth work may be either earth excavation or earth filling or Sometimes both.

Basically the volume of earthwork is computed from length, breadth, and depth of excavation or filling.

However the payment for the earthwork is made according to this volume as well as the lead and lift with regard to area of disposal.

Lead is the average horizontal distance b/w site of earthwork and the area of disposal.

Lift is the average vertical distance b/w level of excavation and to the place of spreading or heaping.

79. **(d)**

Setting out of works

The process of transferring the plan of a structure to the ground for actual construction is known as setting out of works.

It involves marking the location and dimensions of the proposed structure on the ground using pegs, stakes, strings, and other tools.

Setting out of works is necessary to ensure that the construction is carried out according to the design and specifications.

Site clearance

The process of removing all unwanted materials and vegetation from the site before the start of construction is known as site clearance.

It involves clearing the site of trees, bushes, rocks, debris, and any other obstructions that may hinder the construction process.

Site clearance is necessary to provide a clean and safe working environment for the construction workers and equipment.

Steps in deep excavations

In deep excavations, steps or benches are constructed to prevent the sides of the excavation from collapsing and to provide safe access for the workers and equipment.

The depth and width of the steps depend on the type of soil, the angle of repose, and the height of the excavation.

Steps in deep excavations are necessary to ensure the stability and safety of the excavation and to provide safe access for the workers and equipment.

80. **(d)**

Corrugated sheet surfaces and Nainital pattern roof surfaces shall be included with plain surfaces after increasing their areas by the following percentages:

(a) Corrugated steel sheets - 14 percent
(b) Nainital pattern roof (Plain sheets with rolls) - 10 percent
(c) Nainital pattern roof with corrugated sheets - 25 percent
(d) Asbestos cement sheets, corrugated - 20 percent
(e) Asbestos cement sheets, semi-corrugated - 10 percent