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BUGESERA DISTRICT

MARKING GUIDE

TSS 2nd TERM DISTRICT COMPREHENSIVE ASSESSMENT
SCHOOL YEAR: 2024-2025

SECTOR: CONSTRUCTION AND BUILDING SERVICES

TRADE: BUILDING CONSTRUCTION

RQF LEVEL: LEVEL 3

MODULE CODE AND TITLE: BDCBS 301 BUILDING SET OUT

DURATION: 3 hours

DATE: / / 2025

.../100
MARKS

INSTRUCTIONS TO CANDIDATE:

- ✓ This exam has three sections.
- ✓ Maximum marks...../..... Marks
- ✓ Attempt all Questions in A
- ✓ Choose only three questions in section B.
- ✓ Choose only one question in section C.
- ✓ Use pencil to draw any sketch mandatory
- ✓ Draw a line after answer the question

TSS 2nd TERM DISTRICT COMPREHENSIVE ASSESSMENT
SCHOOL YEAR: 2024-2025

SECTION A Attempt all Question**(55marks)**

Q1. Match each site clearing technique (Column A) with the appropriate description or purpose(Column B). **(5marks)**

Column A: Techniques	Column B: Descriptions
1.Selective Clearing	A. Uses heavy machinery like bulldozers, leading to complete land clearance
2.Reforestation	B.A method that removes only specific trees or vegetation to minimize ecological impact.
3.Mechanical Clearing.	C. Maintaining untouched strips of land around water bodies to prevent contamination and preserve habitat.
4.Manual Clearing	D. A labor-intensive method involving hand tools for minimal environmental disturbance.
5.Buffer Zone Preservation	E.A post-clearing strategy that restores native vegetation and ecosystems.

ANSWER: Here is the correct matching of site clearing techniques with their descriptions: for each 1marks

1. **Selective Clearing** → **B.** A method that removes only specific trees or vegetation to minimize ecological impact.
2. **Reforestation** → **E.** A post-clearing strategy that restores native vegetation and ecosystems.
3. **Mechanical Clearing** → **A.** Uses heavy machinery like bulldozers, leading to complete land clearance.
4. **Manual Clearing** → **D.** A labor-intensive method involving hand tools for minimal environmental disturbance.
5. **Buffer Zone Preservation** → **C.** Maintaining untouched strips of land around water bodies to prevent contamination and preserve habitat.

REFERENCE L.O. 2. Clear the site on indicative content 2.2 systematic clearing the site from trees, roots, bushes, grasses and all wastes of the site is done according to the level needed

Q2. If you are assigned to clear a site with dense vegetation and rocky terrain, which tools would you select. **(3marks)**

ANSWER: If assigned to clear a site with dense vegetation and rocky terrain, I would choose the following tools:

1. Cutting and Clearing Tools: /1.5marks

- **Chainsaw** – For cutting down large trees and thick branches.
- **Machete** – Useful for clearing bushes, vines, and smaller vegetation.
- **Brush Cutter** – Ideal for clearing dense undergrowth efficiently.

2. Digging and Rock Removal Tools: /1.5marks

- **Pickaxe** – Helps break up rocky ground and remove stones.
- **Shovel & Spade** – For digging up stumps, roots, and debris.

Reference L.O.1 Select tools materials and equipment on indicative content

1.1 Appropriate tools are selected according to the work to be performed

Q3. Which of the following is NOT a reference point that ensures precise construction demarcation of a building? Baselines, Benchmarks, Walls, Gridlines, Pegs **(2marks)**

ANSWER: The correct answer is:

Walls /2marks

Walls are **not** a reference point used for precise construction demarcation. Instead, construction demarcation typically relies on **Baselines, Benchmarks, Gridlines, and Pegs** to ensure accuracy in layout and positioning.

Reference L.O.3. Set profiles on indicative content 3.4 Methodical demarcation of building lines is done as per drawing dimensions of trenches ,foundation and walls

Q4. Answer by true or false

(4marks)

- a. Site grading is an essential part of leveling the ground for construction as it ensures proper drainage.
- b. Theodolites are used for accurate levelling off the ground during building set out.
- c. An auto level is considered more accurate than a spirit level for large-scale ground leveling.
- d. A benchmark is used only to measure horizontal alignment, not for elevation during ground leveling.
- e. Is it unnecessary to use multiple reference points (benchmarks) when leveling the ground for a building set out?

ANSWER:

Here are the correct True or False answers: for each 1marks

- a. **True** – Site grading is essential for leveling the ground and ensuring proper drainage.
- b. **False** – Theodolites are primarily used for measuring horizontal and vertical angles, not for leveling the ground. Auto levels or dumpy levels are used for accurate leveling.
- c. **True** – An **auto level** is more accurate than a **spirit level** for large-scale ground leveling because it provides precise readings over long distances.
- d. **False** – A benchmark is used for both horizontal alignment and elevation **measurements** during ground leveling.
- e. **False** – It is necessary to use multiple reference points (benchmarks) to ensure accuracy in ground leveling and avoid errors over large areas.

Reference L.O. 2. Clear the site on indicative content 2.3. Systematic assessment of the site is done according to the level needed.

Q5. What are the different adequate materials selected according to the standard for construction purposes, particularly in building set out? **(4marks)**

ANSWER: The following materials are typically selected according to standard construction practices for **building set out**:

Timber pegs / **1marks**

Nails / 1marks

Timber boards / **1marks**

String line / **0.5marks**

Chalk line and pencil / **0.5marks**

Reference L.O.1 Select tools materials and equipment on indicative content 1.3. Adequate materials are selected according to the standard

Q6. Define the term “Grading in building set out” **(2marks)**

ANSWER: /2marks

Grading in building set out refers to the process of adjusting the ground level to ensure a flat and even surface for construction. It involves **shaping** or **levelling** the site by removing excess soil, filling low areas, or redistributing the earth to achieve the desired elevation and slope.

Reference L.O. 2. Clear the site on indicative content 2.3. Systematic assessment of the site is done according to the level needed.

Q7. Choose the letter corresponding to the correct answer in each statement **(5marks)**

1. In a site plan, what does a compass symbol indicate?
 - a. The scale of the drawing
 - b. The wind direction
 - c. The orientation of the site (North direction)
 - d. The height of the structure
2. Which of the following symbols represents a window in architectural drawings?
 - a. A straight line with a break in the middle
 - b. A square with an “X” inside
 - c. A thick solid rectangle
 - d. A double line with a gap in between
3. In a floor plan, what does a thick solid line typically represent?
 - a. A dimension line
 - b. A hidden object
 - c. A structural wall
 - d. A glass partition
4. What symbol is commonly used to represent an electrical outlet in building drawings?
 - a. A circle with two parallel lines

- b. A square with an "X" inside
 - c. A triangle with a dot inside
 - d. A rectangle with diagonal lines
5. What does the abbreviation "CL" stand for in construction drawings?

- a. Ceiling Level
- b. Center Line
- c. Concrete Layer
- d. Column Layout

Here are the correct answers for each statement: for each 1 marks

- 1. In a site plan, what does a compass symbol indicate?
c. The orientation of the site (North direction)
- 2. Which of the following symbols represents a window in architectural drawings?
d. A double line with a gap in between
- 3. In a floor plan, what does a thick solid line typically represent?
c. A structural wall
- 4. What symbol is commonly used to represent an electrical outlet in building drawings?
a. A circle with two parallel lines
- 5. What does the abbreviation "CL" stand for in construction drawings?
b. Center Line

Reference L.O.3 Set profiles on indicative content 3.2 Drawing is correctly interpreted in accordance with standards signs and symbols.

Q8. Give any three (3) parts of GPS (Global Positioning System) (3marks)

ANSWER: for each 1 marks

1. Antenna

- Captures signals from satellites and is usually built-in or external (e.g., in surveying GPS devices).

2. Display Screen

- Shows the GPS location, maps, coordinates, and navigation details (common in handheld and vehicle GPS units).

3. Buttons/Keyboard

- Used for inputting data, setting locations, and navigating through menus.

Reference L.O.3 Set profiles on indicative content 3.3 Surveying instruments are accurately used based on drawing dimensions.

Q9. A surveyor takes staff readings at equal intervals along a road. If the first reading is 1.50 m, and subsequent readings increase by 0.25 m each, what will be the reading at the 5th point?
(3marks)

ANSWER /3MARKS

To solve this, we can use the formula for the n th term of an arithmetic sequence:

$$T_n = T_1 + (n - 1) \times d$$

Where:

- T_n = the reading at the n th point,
- T_1 = the first reading (1.50 m),
- n = the position of the point (5th point),
- d = the common difference between successive readings (0.25 m).

Now, let's calculate the reading at the 5th point:

$$T_5 = 1.50 + (5 - 1) \times 0.25$$

$$T_5 = 1.50 + 4 \times 0.25$$

$$T_5 = 1.50 + 1.00$$

$$T_5 = 2.50 \text{ m}$$

Reference L.O.3 Set profiles on indicative content 3.3 Surveying instruments are accurately used based on drawing dimensions.

Q10. Define the following term: **(3marks)**

- Plane of collimation:
- Height of collimation:
- Datum:

ANSWER :for each 1marks

a. Plane of Collimation

- The **plane of collimation** is the horizontal plane through the line of sight of a leveling instrument (such as a dumpy level or automatic level). It represents the level at which the instrument is set when taking readings, and it ensures that all measurements are taken relative to this horizontal reference.

b. Height of Collimation

- The **height of collimation** is the vertical distance from the instrument's plane of collimation (line of sight) to a known reference point, usually a benchmark or a point on the ground. This height helps in determining the elevations of various points on the survey.

c. Datum

- A **datum** is a reference point or system used to define the elevation or depth of other points. In surveying, a datum is typically a known, established point (such as mean sea level) from which measurements are made for all subsequent elevations or depths. It provides a consistent baseline for determining heights or vertical positions on the Earth's surface.

Reference L.O.3 Set profiles on indicative content 3.3 Surveying instruments are accurately used based on drawing dimensions.

Q11. Mention any (4) four key functions of GPS in building set-out (construction layout) **(4marks)**

ANSWER: for each 1marks

The **Global Positioning System (GPS)** plays a vital role in **building set-out (construction layout)**. Here are **four key functions** of GPS in this process:

1. Accurate Site Location and Boundaries

- GPS helps determine the exact location of the construction site and accurately mark the boundaries, ensuring that the building is placed in the correct location as per the design.

2. Precise Measurement of Elevation

- GPS is used to measure the elevation at different points on the site, ensuring that the ground is properly leveled and that the foundation is placed at the correct height relative to the surrounding terrain.

3. Real-time Positioning and Alignment

- GPS provides real-time positioning data, which helps in aligning structures such as walls, foundations, and roads with high precision during construction, ensuring that all elements are in the correct position.
4. **Faster and Efficient Layout of Coordinates**
- GPS allows for quick and efficient setting out of gridlines, corner points, and reference points on the site, reducing the time and manual effort needed for traditional survey methods. It also minimizes the risk of human error.

Reference L.O.3 Set profiles on indicative content 3.3 Surveying instruments are accurately used based on drawing dimensions.

Q12. Identify any four (4) important reasons to remove topsoil in building set-out (4marks)

ANSWER: for each 1marks

It is important to remove top soil:

- ✓ Because it is loosely compact
- ✓ Because It grows plants which can damage a building
- ✓ In order to reach the subsoil that have bearing capacity
- ✓ Because It can't resist the loading of the building
- ✓ In order to avoid the settlement of the building

Reference L.O. 2.Clear the site on indicative content 2.3 Systematic assessment of the site is done according to the level of the site from uneven top soil

Q13. Name the following figure with the correct title below: bulldozer, Mechanical auger, Tipper truck, Back actor, Pneumatic drill, Mechanical shovel. (4marks)



a).....



b).....



c).....



D).....

ANSWER: for each 1marks



a) Mechanical auger



b) BACKACTOR



c) Mechanical shovel



d) Pneumatic drill

Reference L.O. 2. Clear the site on indicative content 2.3 Systematic assessment of the site is done according to the level of the site from uneven top soil

Q14. Explain the term “setting out of building”

(2marks)

ANSWER:

Building set out or setting out of building refers to the act of measuring and marking out a full-size plan of a building on site. / **2marks**

Reference L.O.3. Set profiles on indicative content 3.4 Methodical demarcation of building lines is done as per drawing dimensions of trenches ,foundation and walls

Q15. Arrange the following actions in the correct order for evaluating environmental hazards during the site investigation process: **(3marks)**

Seek advice from specialists → Evaluate solutions → Recognize risks

ANSWER: The correct order for evaluating environmental hazards during the site investigation process is: / **3marks**

1. **Recognize risks** – Identify potential environmental hazards present on the site, such as soil contamination, flooding risks, or unstable ground conditions.
2. **Seek advice from specialists** – Consult environmental experts, geotechnical engineers, or other specialists to assess the identified risks and their potential impact on the construction project.
3. **Evaluate solutions** – Analyze and implement appropriate mitigation measures or alternative solutions to manage and minimize the identified environmental hazards.

Reference L.O. 2. Clear the site on indicative content 2.1 Assessment of the site condition

Q16. Evaluate the most suitable method for setting out a right-angle building in a large-scale construction project where high precision is required. **(2marks)**

ANSWER: /2marks

The most suitable method for setting out a right-angle building in a large-scale construction project where high precision is required **the Levelling instruments** like Theodolite and Total Station

Reference L.O.3. Set profiles on indicative content 3.4 Methodical demarcation of building lines is done as per drawing dimensions of trenches ,foundation and walls

Q17. Explain the importance of properly maintaining and storing Personal Protective Equipment (PPE) in a construction environment **(2marks)**

ANSWER: Proper maintenance and storage of Personal Protective Equipment (PPE) in a construction environment is essential for ensuring safety, durability, and effectiveness. Here's why it is important:

- Cleaning /0.5marks
- Examination (to observe/inspect carefully /critically) /0.5marks
- Replacement /0.5marks
- Repair and testing /0.5marks

Reference L.O.1. Select tools materials and equipment on indicative content 1.2 appropriate equipment is selected according to the work to be performed

SECTION B Choose only three question (30marks)

Q18. Hand tools and power tools play distinct roles in the setting out process of a construction site. Differentiate between hand tools and power tools according to the following factor: **(10marks)**

- a. Speed:
- b. Precision:
- c. Ease of use:
- d. Suitability:
- e. Power requirement:

ANSWER:

Factor	Hand Tools	Power Tools
1.speed	Slower as they rely on manual effort	Faster due to motorized or automated operation.
2.precision	Can be precise but requires skill and experience for accuracy	Generally more precise due to mechanical consistency
3.Ease of use	Requires physical effort and more skill to operate effectively.	Easier to use as they reduce manual labor and are often designed ergonomically.
4.Suitability	Suitable for smaller tasks or fine detailing in setting out	Best for larger-scale tasks where efficiency and accuracy are required.
5.Power requirement	Do not require external power sources, relying solely on human effort.	Require electricity, batteries, or fuel to operate.

Reference L.O.1 Select tools materials and equipment on indicative content

1.1 Appropriate tools are selected according to the work to be performed

Q19. When assessing site conditions, several key elements must be evaluated to ensure the site is suitable for its intended use. State ten (10) essential factors considered during a site condition assessment. **(10marks)**

ANSWER:

When the client identifies a site, then the building surveyor investigates it to find out

1. The strength of the soil, because this affects the design of the foundations
2. Type of the soil which will be excavated
3. Amount of the water in the ground because this affects the design of the foundations and working procedures.
4. Amount of clean or contaminated ground
5. Amount that the ground slopes
6. Access to services such as mains water, electricity and drainage
7. Best position for the building in terms of the local climate
8. Position of natural features such as trees, rocks, and streams.
9. Position of other buildings near the site
10. Location of site boundaries and access road.

Reference L.O. 2. Clear the site on indicative content 2.1 Assessment of the site condition

Q20. Describe the process of marking the dimensions of trenches using building lines. What tools are typically used to achieve this? **(10marks)**

ANSWER:

Process of Marking the Dimensions of Trenches Using Building Lines

Marking the dimensions of trenches using building lines is a crucial step in construction to ensure accurate excavation for foundations. The process involves the following steps:

1. Site Preparation

- Clear the site of any debris, vegetation, or obstructions.
- Conduct a survey to confirm boundary lines and site levels.

2. Establishing Building Lines

- **Reference Points:** Identify and mark key reference points using a total station, theodolite, or pegs.
- **Corner Stakes:** Drive wooden or steel pegs into the ground at the corners of the planned structure.
- **Profile Boards (Batter Boards):** Fix horizontal boards about 1–1.5 meters away from the trench location to avoid disturbances during excavation.

3. Setting Out the Trenches

- Stretch **mason's string** or **nylon line** tightly between the profile boards to define the trench's outer and inner edges.
- Use a **spirit level** or **line level** to ensure accuracy in alignment and leveling.
- Mark the trench width by setting another set of lines parallel to the first.

4. Verification of Dimensions

- Measure distances between lines using a **tape measure** to confirm they match the approved site plan.
- Check right angles using the **3-4-5 (Pythagorean theorem) method** or a **builder's square**.
- Double-check diagonal measurements to ensure squareness.

5. Marking on the Ground

- Once lines are confirmed, sprinkle **chalk, dry lime, or marking powder** along the string to create visible trench boundaries.
- Use wooden stakes or pegs inside the trench boundary for better visibility.

Tools Typically Used

1. **Measuring Tape** – For measuring dimensions accurately.
2. **Mason's String/Nylon Line** – To define building lines.
3. **Wooden or Steel Pegs** – For setting corner points.
4. **Profile Boards (Batter Boards)** – To hold the string lines.
5. **Spirit Level/Line Level** – To maintain level accuracy.
6. **Theodolite/Total Station** – For precise angular measurements and alignment.
7. **Builder's Square** – To ensure right angles.
8. **Chalk, Lime, or Marking Powder** – For visible ground markings.

Reference L.O.3. Set profiles on indicative content 3.4 Methodical demarcation of building lines is done as per drawing dimensions of trenches ,foundation and walls

Q21. When setting out a building and marking demarcation dimensions for trenches, foundation, and walls. Which the quality checkpoints are essential to ensure accuracy, stability, and compliance with design specifications? **(10marks)**

ANSWER: _Quality checkpoints:

- Check that the measured dimensions on the ground conform with the drawings.
- Check that all corners have a right angle and that the two diagonals are or equal length.
- For the verification of measurement of thickness, width and length of the structure the following instrument are useful such as Tape measure, decameter, etc.....
- Verification of angles of the structure the following instrument are useful such as squares, dump level, Theodolite, total station.....
- Check distances from boundary lines to ensure compliance with zoning regulations.

Reference L.O.3. Set profiles on indicative content 3.4 Dimensions and angles are accurately verified according to the provided drawing.

Q22.After defining dumpy level, discuss steps for temporary adjustment dumpy level.
(10marks)

ANSWER:

A **dumpy level** is an optical surveying instrument used to establish and measure horizontal levels and elevations on a construction site.

Temporary adjustment of a dumpy level is done before taking measurements to ensure accurate leveling. The three main steps are:

1. Setting Up the Tripod and Mounting the Instrument

- Spread the tripod legs **evenly** and adjust them to a convenient height.
- Firmly place the tripod feet into the ground to ensure stability.
- Attach the dumpy level onto the tripod head and **secure it tightly** using the central fixing screw.
- Ensure the instrument is roughly level by adjusting the tripod legs if necessary.

2. Leveling the Instrument Using Foot Screws

- Identify the **three leveling (foot) screws** on the dumpy level.
- Adjust two screws at a time by turning them **in opposite directions** to move the bubble in the circular spirit level.
- When the bubble is centered, adjust the third screw to fine-tune the level.

- Rotate the instrument **360°** to check if the bubble remains in the center. If not, repeat the leveling process.

3. Elimination of Parallax in Surveying

Parallax is the apparent displacement of an object when viewed from different positions. In surveying instruments, parallax occurs when the image of the target does not coincide with the crosshairs of the instrument's telescope, leading to inaccurate readings.

Steps to Eliminate Parallax:

1. Focusing the Eyepiece

- Point the telescope towards a bright background (like the sky or white paper).
- Rotate the **eyepiece adjustment ring** until the crosshairs appear **sharp and clear**.
- This ensures that the observer's eye focuses correctly on the crosshairs and prevents blurriness.

2. Focusing the Objective Lens

- Aim the telescope at the target (e.g., a leveling staff or a distant point).
- Adjust the **focusing knob** until the target appears sharp and clear.
- Ensure that the target image and the crosshairs remain in the same plane.

3. Final Parallax Check

- Slightly move your head up and down or side to side while looking through the telescope.
- If the crosshairs appear to shift against the target, parallax is still present.
- Readjust the focusing until no movement of the crosshairs relative to the target is observed.

Reference L.O.3 Set profiles on indicative content 3.3 Surveying instruments are accurately used based on drawing dimensions.

SECTION C Choose only one questions

(15marks)

Q23. Define "theodolite" and fill the parts of the following figure:

(15marks)



ANSWER: Theodolite: is a precision instrument for measuring distance and angles in horizontal and vertical planes.

1.Sighting collimator **2.** Focusing knob **3.** Eyepiece **4.** Plate level

5.LCD **6.** Operating key **7.** Foot screw **8.** Locking lever **9.** Battery case

10.Instrument height mark **11.** Horizontal clamp **12.** Horizontal tangent screw

13.Data output port **14.** Base locking lever

Q24.the following consecutive reading were taken with a dumpy level and a 4m levelling staff on a continuous sloping ground at 30m interval.

0.585 on A, 0.936 , 1.953 , 2.846 , 3.644 , 3.938 , 0.962 , 1.035, 1.689 , 2.534, 3.844

, 0.956, 1.579 , 3.016 on B. the instrument was shifted after sixth(6th) and twelve 12th readings. The elevation of A is 520. 450m. calculate the R. L of each station by height of instrument method. Apply usual arithmetic checks.

ANSWER:

To calculate the **Reduced Levels (R.L.)** using the **Height of Instrument (H.I.) Method**, we will follow these steps:

Step 1: Understanding Given Data

- **Readings taken at every 30m interval**
- **Back Sight (B.S.):** First reading after instrument shift.
- **Intermediate Sight (I.S.):** Readings between B.S. and F.S.

- **Fore Sight (F.S.):** Last reading before instrument shift.
- **Benchmark (BM) A: R.L. = 520.450m.**
- **Instrument shifted after the 6th and 12th readings.**

Step 2: Organizing Data in a Table

Station	Distance (m)	B.S.	I.S.	F.S.	H.I.	R.L.	Remarks
A	0	0.585			521.035	520.450	BM (Benchmark)
	30		0.936			520.099	
	60		1.953			519.082	
	90		2.846			518.189	
	120		3.644			517.391	
	150	3.938		0.962	521.329	516.467	CP1 (Instrument Shift)
	180		1.035			520.294	
	210		1.689			519.640	
	240		2.534			518.795	
	270	3.844		0.956	522.739	517.839	CP2 (Instrument Shift)
	300		1.579			521.160	
B	330			3.016		518.144	End Station

Step 3: Calculation Process

1. First H.I. Calculation (A - 150m)

- $H.I. = R.L. + B.S.$
- $521.035 = 520.450 + 0.585$
- Compute R.L. for stations until CP1:
 - $520.099 = 521.035 - 0.936$
 - $519.082 = 521.035 - 1.953$
 - $518.189 = 521.035 - 2.846$
 - $517.391 = 521.035 - 3.644$
 - $516.467 = 521.329 - 0.962$ (New instrument setup at CP1)

2. Second H.I. Calculation (CP1 - CP2)

- $H.I. = R.L. + B.S.$
- $521.329 = 516.467 + 3.938$
- Compute R.L.:
 - $520.294 = 521.329 - 1.035$
 - $519.640 = 521.329 - 1.689$
 - $518.795 = 521.329 - 2.534$
 - $517.839 = 522.739 - 0.956$ (New instrument setup at CP2)

3. Third H.I. Calculation (CP2 - B)

- $H.I. = R.L. + B.S.$
- $522.739 = 517.839 + 3.844$
- Compute R.L.:
 - $521.160 = 522.739 - 1.579$
 - $518.144 = 522.739 - 3.016$



Step 4: Arithmetic Check

$$\sum B.S. - \sum F.S. = \text{Last R.L.} - \text{First R.L.}$$

$$(0.585 + 3.938 + 3.844) - (0.962 + 0.956 + 3.016) = 518.144 - 520.450$$

$$8.367 - 4.934 = -2.306$$

$$518.144 - 520.450 = -2.306$$

Reference L.O.3 Set profiles on indicative content 3.3 Surveying instruments are accurately used based on drawing dimensions.