

# CONSTRUCTION MATERIALS

**TABLE OF SPECIFICATION FOR CONSTRUCTION MATERIALS 25CE111**

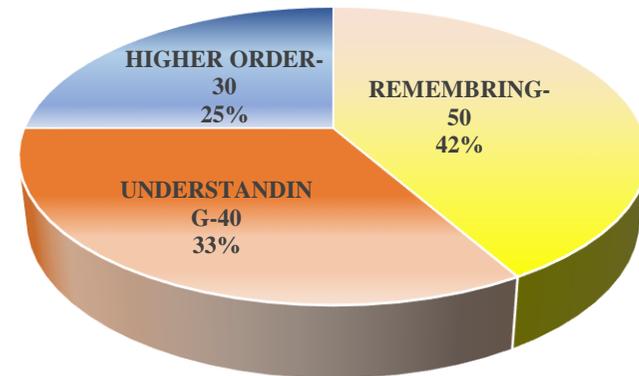
CL CO	REMEMBRING				UNDERSTANDING					HIGHER ORDER	TOTAL
	MCQ+FB	2M	3M	5M	MCQ+FB	2M	3M	5M	10M	10M	
CO1	2				3						5
CO2	5	2	3	2	4	2	3	2	2	3	105*
CO3	3	2	1	2	3	2	1	2			40
<b>TOTAL</b>	<b>10</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>10</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>150</b>

No of questions				
MCQ+FB	2M	3M	5M	10M
20	8	8	8	5

***\*Week wise distribution of marks in SEE***

WEEK	MARKS
1,2	30
3,4,5	40
6	10
7,8,9	25
10,11	15
12,13	30
<b>TOTAL</b>	<b>150</b>

***Percentage Distribution Of Cognitive Levels In Construction Materials 25CE111***



# 1. Question Paper: CONSTRUCTION MATERIALS

**Government of Karnataka  
Department of Technical Education  
Board of Technical Examinations**

**Model Question Paper - 1**

**Course: CONSTRUCTION MATERIALS**

**Course Code: 25CE11I**

**Time: 3 Hrs.**

**Max. Marks :100**

**Instructions:**

- For **Part A**, only the first attempted answers will be considered for evaluation.
- Use neat sketches/diagrams wherever necessary.
- Assume data wherever required and state them clearly.
- All parts are compulsory, except where choice is provided.
- All dimensions are in metric units unless stated otherwise.

**PART – A**

**I. Multiple Choice Questions (15 × 1 = 15 Marks)**

1. Which of the following rocks is an example of an igneous rock?  
a) Limestone    b) Sandstone    c) Granite    d) Slate
2. Which of the following is NOT a physical property of aggregates?  
a) Specific gravity    b) Fineness modulus    c) Chemical composition    d) Bulk density
3. Which of the following is the main ingredient of Ordinary Portland Cement (OPC)?  
a) Gypsum    b) Lime    c) Alumina    d) Iron oxide
4. A construction project requires rapid setting of concrete for emergency repairs in a cold climate. Which type of cement would be most suitable for this application?  
a) Ordinary Portland Cement (OPC) 43 Grade    b) Portland Pozzolana Cement (PPC)  
c) Rapid Hardening Cement    d) Low Heat Cement
5. Which class of bricks is generally recommended for exposed masonry work due to its superior quality?  
a) I class bricks    b) II class bricks  
c) III class bricks    d) Common burnt clay bricks
6. In the manufacturing process of bricks, the burning is typically done in:  
a) Open fields    b) Kilns    c) Water tanks    d) Cold storage units
7. Which type of block is lightweight, porous, and known for good thermal insulation properties?  
a) Solid Concrete Blocks    b) Hollow Concrete Blocks

- c) Autoclaved Aerated Concrete Blocks (AAC) d) Interlocking Masonry Solid Blocks
8. Which part of an exogenous tree is responsible for the growth in girth?  
a) Pith                      b) Sapwood    c) Bark                      d) Cambium layer
9. Which material is commonly used for making reinforcement bars (rebars) in concrete?  
a) Cast Iron              b) Mild Steel    c) Stainless Steel              d) TMT bars
10. PVC is commonly used for:  
a) High-temperature applications                      b) Water pipes and electrical conduits  
c) Structural members                                      d) Transparent sheets
11. Which flooring material is derived from clay and typically has a rustic, earthy appearance?  
a) Vitrified Tiles              b) Marble Slabs              c) Terra-cotta                      d) Granite Slabs
12. What is the primary objective of applying paint on a surface?  
a) To increase its weight    b) To provide a protective and decorative finish  
c) To make it conductive    d) To reduce its lifespan
13. Which of the following is a general property of glass?  
a) Crystalline structure    b) High elasticity              c) Amorphous solid              d) Opaque nature
14. Fly ash is a by-product of:  
a) Steel manufacturing                                      b) Cement production  
c) Coal combustion in thermal power plants              d) Timber processing
15. Ferro-cement products are known for their:  
a) High weight and low strength    b) Thin sections, lightweight, and high strength  
c) Brittleness and poor durability              d) Limited application in construction

## II. Fill in the Blanks (5 × 1 = 5 Marks)

Choose correct answers from the bracket:

1. The process of extracting stone from natural rock beds is called \_\_\_\_\_
2. \_\_\_\_\_ bricks are made using the waste product from thermal power plants.
3. \_\_\_\_\_ glass is the most common type of glass used for window panes.
4. A defect in timber caused by fungal attack is known as \_\_\_\_\_.
5. \_\_\_\_\_ is a by-product of the steel industry, used as a supplementary cementitious material.

## **PART – B**

**Answer any FIVE questions: (5 × 2 = 10 Marks)**

1. List any two requirements of a good building stone?
2. Identify (any four) the major ingredients of Ordinary Portland Cement
3. Mention any two advantages of Flyash bricks.
4. List any two properties of good timber.
5. State the application of Rebar Steel (TMT bars) in civil construction.
6. Mention any two uses of Vitrified tiles?
7. Name two types of special glasses and their applications
8. Write any two applications of bitumen in civil works.

## **PART – C**

**Answer any FIVE questions: (5 × 3 = 15 Marks)**

1. Differentiate between granite and sandstone based on their properties.
2. Quote the functions of lime and silica in Ordinary Portland Cement?
3. Differentiate between first-class and second-class bricks?
4. Explain any three advantages of using Autoclaved Aerated Concrete Blocks (AAC) over traditional solid concrete blocks in terms of their properties.
5. Mention the objectives of seasoning and preservation of timber?
6. Compare ceramic tiles and vitrified tiles in terms of properties.
7. Differentiate between Thermo-plastic and Thermo-Setting Plastics
8. List two applications of Plaster of Paris in civil engineering works

## **PART – D – Section I**

**Answer any FIVE questions: (5 × 5 = 25 Marks)**

1. Describe the wedging method of quarrying stones.
2. Define CSEB? Write any two advantages and environmental benefits.
3. Mention the advantages and uses of interlocking masonry solid blocks?
4. Describe the role of primer and varnish in painting works.
5. Differentiate between Emulsion Paint and Enamel Paint
6. Discuss the characteristics and uses of Terra-cotta as a flooring material.
7. Why is granite preferred for heavy foundation works compared to slate?
8. A bag of cement was stored improperly and became lumpy. Can it still be used for concreting works Justify your answer.

## **PART – D – Section II**

**Answer any THREE questions: (3 × 10 = 30 Marks)**

1. Explain the properties (any three) and applications (any two) of Basalt and laterite of rocks used in construction.
2. Distinguish between solid and hollow concrete blocks based on properties (any three) and applications (any two).
3. Explain the concept of Ferro-cement Products and discuss their advantages and applications in construction.
4. In a high-rise building, the site has limited access to natural river sand but has a readily available supply of M-Sand. Discuss the advantages and disadvantages of using M-Sand over river sand for concrete production.
5. For a road construction project, you need aggregates for the base course. Describe the key physical properties of aggregates you would consider when selecting suitable material for this purpose.

**Government of Karnataka**  
**Department of Technical Education**  
**Board of Technical Examinations**  
**Model Question Paper - 2**

**Course: CONSTRUCTION MATERIALS**

**Course Code: 25CE11I**

**Time: 3 Hrs.**

**Max. Marks :100**

**Instructions:**

- *For Part A, only the first attempted answers will be considered for evaluation.*
- *Use neat sketches/diagrams wherever necessary.*
- *Assume data wherever required and state them clearly.*
- *All parts are compulsory, except where choice is provided.*
- *All dimensions are in metric units unless stated otherwise.*

**PART – A**

**I. Multiple Choice Questions (15 × 1 = 15 Marks)**

1. Which of the following is a metamorphic rock?  
a) Basalt   b) Quartzite   c) Sandstone   d) Limestone
2. For good concrete, fine aggregates should generally be:  
a) Angular and flaky                      b) Rounded and smooth  
c) Cubical and well-graded              d) Flat and elongated
3. What is the primary function of gypsum in cement manufacturing?  
a) To provide strength                      b) To impart color  
c) To control the setting time              d) To reduce heat of hydration
4. Which of the following statements about the storage of cement is crucial for maintaining its quality on a construction site?  
a) Cement bags can be stacked directly on the ground in a covered area.  
b) Stacking height of cement bags does not affect its quality.  
c) Cement should be stored in a dry, well-ventilated place, clear of the ground and walls.  
d) Storing cement near water sources helps prevent premature hardening.
5. Flyash bricks are considered a sustainable construction material because they:  
a) Require more energy for production   b) Utilize industrial waste  
c) Are heavier than traditional bricks                      d) Have high water absorption

6. You are inspecting a batch of bricks delivered to a construction site. Which of the following observations would indicate that the bricks are of good quality (First Class Bricks)?
- a) Irregular shape and rough surfaces.
  - b) Dull sound when struck with a hammer.
  - c) Uniform reddish-brown color, sharp edges, and a metallic ringing sound when struck.
  - d) High water absorption (above 20% of dry weight).
7. A construction project involves building a furnace lining for high-temperature operations. Which type of brick would be the most suitable choice for this application?
- a) Flyash bricks
  - b) First Class Clay Bricks
  - c) Fire/Refractory Bricks
  - d) Autoclaved Aerated Concrete Blocks (AAC)
8. The process of removing moisture from freshly cut timber to improve its properties is called:
- a) Preserving
  - b) Treating
  - c) Seasoning
  - d) Grading
9. What is the main advantage of Galvanized Iron (GI) over ordinary iron?
- a) Higher strength
  - b) Better corrosion resistance
  - c) Lighter weight
  - d) Easier to weld
10. What does "UPVC" stand for?
- a) Un-Plasticized Vinyl Chloride
  - b) Under Pressure Vinyl Compound
  - c) Ultra Poly Vinyl Carbon
  - d) Universal Polymer Vinyl Coating
11. Which flooring material is a natural stone known for its intricate patterns and luxurious appearance?
- a) Ceramic Tiles
  - b) Vitrified Tiles
  - c) Granite Slabs
  - d) Marble Slabs
12. Which type of paint is water-based and commonly used for interior walls due to its quick drying time
- a) Enamel Paint
  - b) Cement Paint
  - c) Emulsion Paint
  - d) Aluminium Paint
13. Soda-lime glass is the most common type of glass and is primarily used for:
- a) High-temperature laboratory equipment
  - b) Optical lenses
  - c) Window panes and bottles
  - d) Bulletproof glass
14. CSEB stands for:
- a) Cement Stabilized Earth Blocks
  - b) Compressed Sustainable Energy Blocks
  - c) Carbonated Stone Earth Blocks
  - d) Compacted Soil Environmental Bricks
15. What is the main application of Plaster of Paris (POP) in construction?
- a) Structural elements
  - b) Finishing work, ornamental casts, and false ceilings
  - c) Road construction
  - d) Waterproofing

## II. Fill in the Blanks (5 × 1 = 5 Marks)

1. Aggregates passing through a 4.75 mm IS sieve are classified as \_\_\_\_\_ aggregates.
2. The outermost layer of an exogenous tree is called \_\_\_\_\_.
3. \_\_\_\_\_ type of rebar steel widely used in reinforced concrete for their high strength and ductility.
4. \_\_\_\_\_ is a non-ferrous metal known for its lightweight and corrosion-resistant properties.
5. \_\_\_\_\_ is a waterproofing material commonly used in road construction and roofing.

### PART – B

**Answer any FIVE questions: (5 × 2 = 10 Marks)**

1. List any two common types of rocks used in construction and mention one application for each.
2. List the classifications of bricks based on quality.
3. List the uses of Bitumen.
4. Identify any four common defects that can occur in timber.
5. List two common applications each for PVC and UPVC in construction.
6. State any two characteristics of good paint.
7. Give one common application for Soda Lime Glass and Potash Lead Glass.
8. Name two sustainable construction materials and state one benefit of using each.

### PART – C

**Answer any FIVE questions: (5 × 3 = 15 Marks)**

1. List the properties of Portland Slag cement
2. Explain why proper storage of cement is crucial for maintaining its quality, and mention one consequence of improper storage.
3. List any three advantages of fly ash bricks over conventional clay bricks.
4. Mention the primary objective of seasoning timber, and how does it benefit the timber?
5. Compare the main use of Mild Steel and Rebar Steel (TMT bars).
6. List the importance of using sustainable materials in construction?
7. Describe one key property and two common applications of Terra-cotta as a flooring material.
8. Explain the advantages of using ferro-cement in construction?

### PART – D – Section I

**Answer any FIVE questions: (5 × 5 = 25 Marks)**

1. Define FRP? Explain its properties and areas of application
2. Compare HDPE and LDPE.
3. Compare the properties and uses of Mild Steel and Cast Iron.
4. Define sustainable materials. Explain the benefits of using them in civil works.

5. What is seasoning of timber? Explain natural seasoning
6. Draw the flow chart of the dry process of manufacturing cement.
7. Which type of block would you recommend for a thermally insulated building and justify your choice
8. You are specifying materials for hot water plumbing pipes in a residential building. Which type of plastic – PVC, UPVC, or CPVC – would be most suitable for this application, and why?

#### **PART – D – Section II**

**Answer any THREE questions: (3 × 10 = 30 Marks)**

1. Explain the properties (any three) and applications (any two) of Quartzite and Gneiss of rocks used in construction.
2. List the physical properties of aggregates used in building construction and explain any three.
3. Explain the Autoclave Aerated Blocks (AAC) over traditional solid concrete blocks in terms of their properties and applications.
4. During a site inspection, you notice that bags of cement are stored directly on the ground in an open area. Explain the potential consequences of this improper storage on the cement's quality and the resulting concrete. What are the ideal storage conditions for cement bags on a construction site?
5. You are preparing an old, exposed brick wall for painting. Before applying the final paint, which type of "primer" (wall, metal, or wood) would you use, and why? Explain the objectives of using a primer in this context.

**Government of Karnataka**  
**Department of Technical Education**  
**Board of Technical Examinations**  
**Model Question Paper -3**

**Course: CONSTRUCTION MATERIALS**

**Course Code: 25CE11I**

**Time: 3 Hrs.**

**Max. Marks :100**

**Instructions:**

- *For Part A, only the first attempted answers will be considered for evaluation.*
- *Use neat sketches/diagrams wherever necessary.*
- *Assume data wherever required and state them clearly.*
- *All parts are compulsory, except where choice is provided.*
- *All dimensions are in metric units unless stated otherwise.*

**PART – A**

**I. Multiple Choice Questions (15 × 1 = 15 Marks)**

1. Which of the following rocks is an example of a Sedimentary rock?  
a) Laterite      b) Sandstone      c) Granite      d) Slate
2. If river sand is not available, the best replacement for plastering is:  
a) Crushed stone dust      b) M-sand      c) P-sand      d) Coarse aggregate
3. Cement should ideally be stored in:  
a) Open areas exposed to air      b) Damp environments to prevent drying  
c) Dry, moisture-free conditions      d) Stacks higher than 10 bags
4. The key difference between OPC 43 and OPC 53 is:  
a) Colour      b) Compressive strength at 28 days      c) Setting time      d) Ingredients
5. What is a significant advantage of using Hollow Concrete Blocks in masonry construction compared to Solid Concrete Blocks?  
a) Higher sound transmission.      b) Increased dead load on the structure.  
c) Reduced material consumption, lighter weight, and improved thermal insulation.  
d) Slower construction speed.
6. Interlocking blocks reduce construction time by eliminating:  
a) Cement      b) Mortar      c) Steel reinforcement      d) Curing
7. First-class bricks must have water absorption less than:  
a) 5%      b) 10%      c) 15%      d) 20%
8. Which of the following is a desirable property of good timber?  
a) High moisture content      b) Prone to decay      c) Uniform texture      d) Low strength

9. Which material is known for its excellent resistance to corrosion, especially in aggressive environments?  
a) Mild Steel    b) Cast Iron    c) Stainless Steel    d) Aluminium
10. CPVC is generally preferred over PVC for applications involving:  
a) Cold water only                      b) Higher temperatures and pressures  
c) Electrical insulation    d) Outdoor decorative purposes
11. Which type of tile is known for its very low water absorption and high durability, making it suitable for both indoor and outdoor use?  
a) Ceramic Tiles    b) Terracotta    c) Vitrified Tiles                      d) Granite Slabs
12. Which coating is primarily used to prepare a surface for painting, ensuring better adhesion and a uniform finish?  
a) Varnish                      b) Wall Putty                      c) Primer                      d) Lime Distemper
13. Common glass is primarily composed of:  
a) Only silica    b) Silica, soda, and lime                      c) Lead and potash    d) Boron and silica
14. CRMB refers to:  
a) Cement Reinforced Masonry Blocks    b) Crumb Rubber Modified Bitumen  
c) Carbon Resistant Metallic Bars                      d) Concrete Recycled Material Blends
15. Bitumen is commonly used as a binder in:  
a) Concrete    b) Steel structures  
c) Asphalt concrete for road paving    d) Glass manufacturing

**II. Fill in the Blanks (5 × 1 = 5 Marks)**

1. Aggregates retaining in 4.75 mm IS sieve and above sieve sizes are classified as \_\_\_\_\_ aggregates.
2. \_\_\_\_\_ paint is commonly used for metallic surfaces to prevent corrosion.
3. The process of burning bricks in a \_\_\_\_\_ kiln is continuous and more efficient than clamp burning.
4. \_\_\_\_\_ is a type of plastic pipe used for underground drainage due to its high durability.
5. \_\_\_\_\_ is an example of a metamorphic rock used for flooring and decorative purposes.

**PART – B**

**Answer any FIVE questions: (5 × 2 = 10 Marks)**

1. List any two physical properties of coarse aggregates.
2. Mention the main benefits of using Flyash
3. State two applications of galvanized iron.
4. Mention any two uses of Fibre-Reinforced Plastic (FRP).

5. Write any two general properties of glass.
6. Write any two uses of GGBS in construction.
7. State any two uses of Plaster of Paris (POP) in construction.
8. For making a lightweight window frame in a multi-storey building, which non-ferrous material would be ideal?

### **PART – C**

**Answer any FIVE questions: (5 × 3 = 15 Marks)**

1. List the uses of Portland Pozzolona Cement
2. Differentiate between Clamp and Hoffman's Kiln method of brick burning.
3. Define sustainable materials. Explain the benefits of using them in civil works.
4. List common defects in timber.
5. Why is TMT steel preferred over mild steel in RCC construction?
6. Differentiate between soda-lime glass and potash-lead glass.
7. Define Plaster of Paris? Mention their applications.
8. Mention the benefits of using bamboo as a construction material?

### **PART – D – Section I**

**Answer any FIVE questions: (5 × 5 = 25 Marks)**

1. Differentiate between fine aggregates and coarse aggregates.
2. Explain any five requirements of a good quality building brick.
3. Write the properties and uses of UPVC and CPVC in construction
4. Define Fibre-Reinforced Plastic (FRP). What are advantages in civil engineering?
5. Why is the preservation of timber necessary, and what are its main objectives?
6. Compare the use of white cement and OPC in architectural finishes. Which one is more suitable for decorative works and why?
7. List the need for sustainable materials.
8. Comparison between vitrified tiles and ceramic tiles?

### **PART – D – Section II**

**Answer any THREE questions: (3 × 10 = 30 Marks)**

1. Explain the properties (any three) and applications (any two) of Granite and Laterite of rocks used in construction.
2. Explain the advantages and Applications of using Ferro-cement in construction
3. Explain the structure of an exogenous tree with a labelled sketch.
4. A plastering job requires a smooth finish on interior walls. You have access to River sand, M-Sand, and Plastering Sand (P-sand). Which type of sand would you select for this application,

and why? Compare the characteristics of your chosen sand with the other two options in terms of workability and finish.

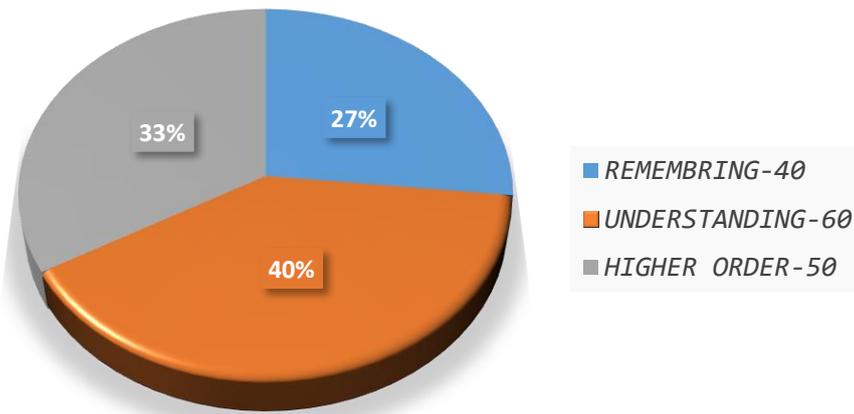
5. A building project aims to minimize its environmental footprint and improve thermal insulation. Which type of block among Fly ash bricks, Masonry Concrete blocks (Solid & Hollow), and Autoclaved Aerated Concrete Blocks (AAC) would you recommend for the external walls, and *why*? Discuss the sustainability aspects and thermal properties of your chosen material.

# BASIC SURVEYING

*Table of specification for Basic Surveying 25CE22I*

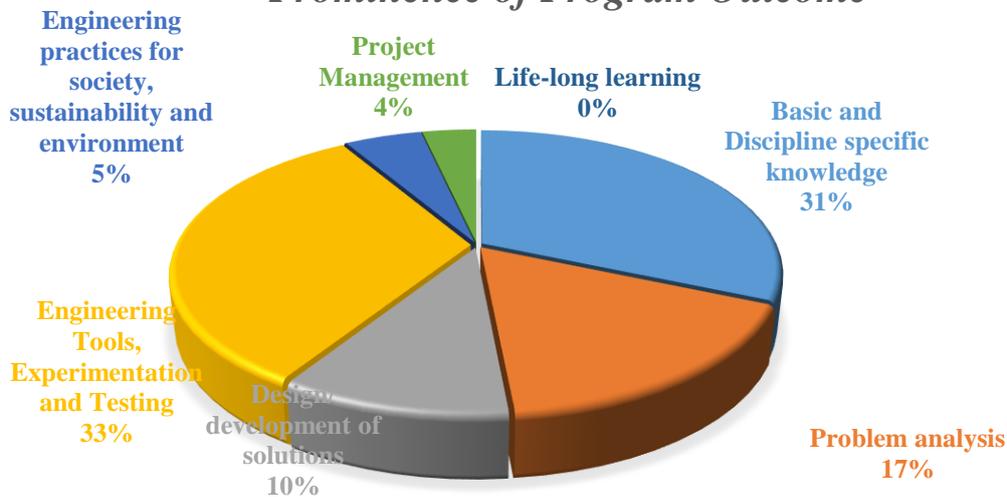
CL CO	Remembering				Understanding				Higher Order	Total Marks
	MCQ+FB	2M	3M	5M	MCQ+FB	2M	3M	5M	10M	
CO1	5	1	1							<b>10</b>
CO2	5		1	1		2	2	1	1	<b>38</b>
CO3	3	1			3	1		2	1	<b>30</b>
CO4		2	1		2		2	2	2	<b>45</b>
CO5				1	2	1	1	1	1	<b>27</b>
<b>TOTAL</b>	<b>13</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>7</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>5</b>	<b>150</b>

*Percentage Distribution Of Cognitive Levels  
In Basic Surveying 25CE22I*



No of questions				
MCQ+FB	2M	3M	5M	10M
20	8	8	8	5

*Prominence of Program Outcome*



# 1. Question Paper: BASIC SURVEYING

**Government of Karnataka  
Department of Technical Education  
Board of Technical Examinations**

Model Question Paper

**Course: Basic Surveying  
Time: 3 HRs**

**Course Code: 25CE22I  
Max. Marks :100**

**Instructions:**

- For **Part A**, only the first attempted answers will be considered for evaluation.
- Use neat sketches/diagrams wherever necessary.
- Assume data wherever required and state them clearly.
- All parts are **compulsory**, except where choice is provided.
- All dimensions are in metric units unless stated otherwise.

**PART – A**

**I. Multiple Choice Questions (15 × 1 = 15 Marks)**

1. The main objective of surveying is:
  - a) Locate underground resources
  - b) Prepare graphical representation of the earth's surface
  - c) Conduct meteorological studies
  - d) Establish national parks
2. Plane surveying assumes:
  - a) Earth is spherical
  - b) Earth's curvature is negligible
  - c) Earth's magnetic field is ignored
  - d) All distances are equal
3. Which is **not** a type of chain?
  - a) Metric chain
  - b) Engineer's chain
  - c) Optical chain
  - d) Revenue chain
4. A line joining two survey stations is called:
  - a) Check line
  - b) Tie line
  - c) Base line
  - d) Offset line
5. An instrument used to set right angles during chaining:
  - a) Line ranger
  - b) Cross-staff
  - c) Ranging rod
  - d) Dumpy level
6. In reciprocal ranging, communication between stations is required because:

- a) Terrain is even
  - b) The chain is damaged
  - c) The line of sight is obstructed
  - d) It is a night survey
7. Which of the following bearings lie in the 3rd quadrant?
- a)  $120^\circ$
  - b)  $S30^\circ W$
  - c)  $N30^\circ E$
  - d)  $W10^\circ N$
8. The method of levelling suitable for route surveys is:
- a) Reciprocal levelling
  - b) Fly levelling
  - c) Profile levelling
  - d) Differential levelling
9. The term "Back sight" in levelling refers to:
- a) First reading from a new setup
  - b) Last reading before moving instrument
  - c) Reading at change point
  - o d) Reading taken on intermediate points
10. Contour lines never:
- a) Cross each other
  - b) Form closed loops
  - c) Show steep slopes
  - d) Represent elevation
11. Which instrument helps detect local attraction in compass surveying?
- a) Dumpy level
  - b) Prismatic compass
  - c) Line ranger
  - d) Total station
12. The primary axis of a dumpy level is:
- a) Horizontal axis
  - b) Vertical axis
  - c) Line of collimation
  - d) Bubble axis
13. An error due to sag in chain is:
- a) Personal error
  - b) Natural error
  - c) Instrumental error
  - d) Random error
14. Contour interval depends on:
- a) Type of terrain
  - b) Type of chain used
  - c) Magnetic declination
  - d) Size of staff used
15. A tie line in chain surveying is used to:
- a) Join check stations
  - b) Locate inaccessible points
  - c) Avoid obstacles
  - d) Connect two main survey lines

## II. Fill in the Blanks ( $5 \times 1 = 5$ Marks)

Choose correct answers from the bracket:

(Offset, Optical Square, Datum, Local Attraction, Change Point)

1. A \_\_\_\_\_ is the reference surface from which elevations are measured.
2. The instrument used for setting a right angle is \_\_\_\_\_.
3. \_\_\_\_\_ occurs when a compass reading is disturbed by nearby metal objects.
4. The point where foresight and backsight readings are taken is called a \_\_\_\_\_.
5. A short perpendicular distance from the survey line to the object is known as an \_\_\_\_\_.

### PART – B

Answer any FIVE questions: ( $5 \times 2 = 10$  Marks)

1. Define surveying and state two of its primary objectives.
2. Distinguish between true and magnetic bearing.
3. List two types of offsets and give an example of each.
4. Describe the purpose of a tie station in a chain triangulation survey?
5. Name any four errors in Compass surveying.
6. Differentiate between temporary and permanent benchmarks.
7. Define reduced level?
8. State any two uses of contour maps.

### PART – C

Answer any FIVE questions: ( $5 \times 3 = 15$  Marks)

1. Explain the principle of “Working from whole to part” in surveying.
2. Explain direct ranging using a line ranger with a neat sketch
3. List the components of a prismatic compass?
4. How is chaining done on a sloping ground using the stepping method?
5. Explain the difference between H.I. method and Rise & Fall method.
6. Justify the need for check lines in chain triangulation.
7. Mention the errors due to natural causes in Leveling.
8. Explain interpolation of contours?

### PART – D – Section I

Answer any FIVE questions: ( $5 \times 5 = 25$  Marks)

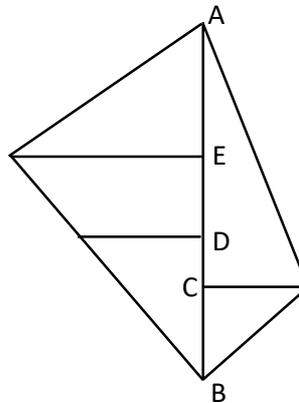
1. Describe the classification of surveying with examples.
2. Explain the procedure and precautions in reciprocal levelling.
3. Mention the various obstacles in chaining and how are they overcome?
4. Explain how interior and exterior angles are determined from given bearings.

5. Convert the following whole circle bearings into reduced bearings and vice versa. Show quadrant and direction: i)  $135^\circ$  ii)  $270^\circ$  iii)  $N45^\circ W$  iv)  $S60^\circ E$  v)  $N45^\circ E$
6. Describe the uses of contours in route location with a neat sketch.
7. Explain the temporary adjustments of a dumpy level.
8. Explain reciprocal ranging with a neat diagram

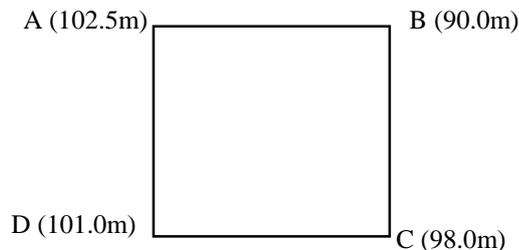
### PART – D – Section II

**Answer any THREE questions:** ( $3 \times 10 = 30$  Marks)

1. A chain survey is conducted over a field with the following observations. Calculate the area using **perpendicular offsets from cross staff survey**: Base line AB = 100 m, Perpendicular offsets from A to B: 25 m, 15 m, 10 m, Chainage of A is 0m, Chainage of E is 40m, Chainage of D is 60m, Chainage of C is 70m, Chainage of B is 100m.



2. Describe the steps to detect and correct local attraction in a compass traverse?
3. The following consecutive readings were taken with a level: 1.320, 1.980, 2.450, 1.640, 0.960, 1.120. The first and last readings were taken on benchmarks having an RL of 100.000 m and 101.500 m respectively. Tabulate the readings using the Rise and Fall method, and apply necessary checks.
4. A closed compass traverse gave the following WCB bearings. Detect and correct for local attraction and calculate corrected bearings:  $AB = 45^\circ$ ,  $BC = 120^\circ$ ,  $CD = 210^\circ$ ,  $DA = 315^\circ$
5. Given the spot levels of four grid points forming a square as shown below, interpolate the 100 m contour line within the square using the arithmetic calculation method. Justify your interpolation steps. Assume grid spacing is 10m x 10m. Draw the contour of RL 100.00m`



## 2. Question Paper: BASIC SURVEYING

Government of Karnataka  
Department of Technical Education  
Board of Technical Examinations

Model Question Paper

Course: Basic Surveying  
Time: 3 HRs

Course Code: 25CE22I  
Max. Marks :100

### Instructions:

- For **Part A**, only the first attempted answers will be considered for evaluation.
- Use neat sketches/diagrams wherever necessary.
- Assume data wherever required and state them clearly.
- All parts are **compulsory**, except where choice is provided.
- All dimensions are in metric units unless stated otherwise.

### PART – A

#### I. Multiple Choice Questions (15 × 1 = 15 Marks)

1. The smallest division in a metric chain is:
  - a) 5 mm
  - b) 10 cm
  - c) 1 m
  - d) 20 cm
2. Which tape is most affected by temperature?
  - a) Invar tape
  - b) Steel tape
  - c) Linen tape
  - d) Fiberglass tape
3. In chain surveying, a tie line is used to:
  - a) Avoid large triangles
  - b) Connect two stations directly
  - c) Check accuracy
  - d) Locate interior details
4. Ranging rods are painted:
  - a) Red and black
  - b) Black and white
  - c) Red and white
  - d) Yellow and black
5. Direct ranging is difficult when:
  - a) Slope is flat
  - b) Line of sight is obstructed
  - c) Steel tape is used
  - d) Compass bearing is unknown
6. A prism square is used for:

- a) Measuring angles
  - b) Setting right angles
  - c) Calculating area
  - d) Adjusting level
7. Instrumental errors in compass arise due to:
- a) Sunlight reflection
  - b) Inaccurate graduation
  - c) Sag in chain
  - d) High wind
8. Whole circle bearing of N45°W is:
- a) 45°
  - b) 135°
  - c) 315°
  - d) 225°
9. Dip of the magnetic needle is zero at:
- a) Equator
  - b) Poles
  - c) 45° Latitude
  - d) Magnetic declination
10. The fundamental axis in dumpy level is:
- a) Horizontal axis
  - b) Vertical axis
  - c) Line of collimation
  - d) Axis of bubble tube
11. A datum is:
- a) Arbitrary reference line
  - b) Temporary benchmark
  - c) Reference plane for RL
  - d) Reading on a staff
12. Back sight is always taken on:
- a) Change point
  - b) Benchmark
  - c) Foresight
  - d) Intermediate point
13. Area calculated using trapezoidal rule is more accurate when:
- a) Offsets are irregular
  - b) Offsets are uniformly spaced
  - c) Fewer readings are taken
  - d) Ground is hilly
14. The area of an irregular boundary is best measured using:
- a) Compass
  - b) Plane table
  - c) Chain and offset
  - d) Theodolite
15. Contour lines closely spaced indicate:
- a) Gentle slope
  - b) Steep slope
  - c) Flat terrain
  - d) Depression

## II. Fill in the Blanks ( $5 \times 1 = 5$ Marks)

Choose correct answers from the bracket:

(Reduced Level, Simple, Chainage, Magnetic Dip, Offset)

1. The difference between magnetic and true meridian is called \_\_\_\_\_.
2. The horizontal distance measured from a fixed point along a survey line is known as \_\_\_\_\_.
3. A \_\_\_\_\_ is a lateral distance measured from the main survey line.
4. The process of levelling done without shifting of instruments is known as \_\_\_\_\_ levelling.
5. The elevation of a point with respect to datum is the \_\_\_\_\_.

### PART – B

Answer any FIVE questions: ( $5 \times 2 = 10$  Marks)

1. Define tie line and state its purpose.
2. List any two errors in compass surveying and how they are avoided.
3. Explain the concept of local attraction in simple terms.
4. Differentiate between Contour interval and Horizontal equivalent
5. Mention the uses of prismatic compass.
6. Differentiate between true meridian and magnetic meridian
7. Explain the concept of reciprocal levelling.
8. Describe the process of booking of levels in surveying.

### PART – C

Answer any FIVE questions: ( $5 \times 3 = 15$  Marks)

1. Explain how indirect ranging is carried out with neat sketch.
2. Differentiate between GTS benchmark and permanent benchmark.
3. Define line of collimation. Describe how it is established in a dumpy level.
4. Explain the marking of first station in chain surveying with neat sketch
5. Explain the procedure to interpolate contours between two known points.
6. Give a real-life example where contour gradients are crucial.
7. State any three precautions while using prismatic compass.
8. Justify why plane surveying is suitable for small areas only.?

### PART – D – Section I

Answer any FIVE questions: ( $5 \times 5 = 25$  Marks)

1. Develop a typical field book entry for a chain traverse, that includes offsets to a building corner and a tree.
2. Describe different types of chains used in chain surveying with their applications.
3. What is whole circle bearing system? Convert the following RBs to WCBs:  
a)  $N45^\circ E$    b)  $S60^\circ E$    c)  $N30^\circ W$    d)  $S75^\circ W$

4. Describe the procedure for Fly levelling with a neat sketch.
5. In a simple levelling operation, the following readings were recorded: 0.765, 1.240, 1.865, 2.300, 1.430, 0.950, The first point has an RL of 150.000 m. Reduce the levels using Rise & Fall method and apply arithmetic check.
6. Describe the various offset types with sketch
7. Explain magnetic declination and how it affects compass readings.
8. List the characteristics of contours.

### PART – D – Section II

**Answer any THREE questions:** (3 × 10 = 30 Marks)

1. A closed compass traverse has the following observed bearings:

Line	Observed Bearing
AB	60°
BC	135°
CD	210°
DA	310°

Determine if local attraction is present. Correct the bearings assuming AB has no error, and find the back bearings and interior angles

2. Plot the cross-staff survey of a field ACDBFE from the field book measurements given in Figure and determine the area of the field.

F 160	1000 B	
	K 750	
	I 600	140 D
E 150	H 300	
	G 200	120 C
	O A	

3. A dumpy level was used in a levelling operation. The readings were:

Station	BS	IS	FS	Remarks
1	1.250			On BM (RL=100.00)
2		2.100		
3	1.150		0.850	Change Point
4	2.400		1.900	Change Point
5		0.750		
6		1.600		
7			0.300	Last Point

RL of A = 100.000 m. Tabulate levels using Height of Instrument method. Apply checks.

4. Define contour. Draw hypothetical contours with proper spacing for the steep slope, Ridge, Valley, Pond, and Hillock.
5. While conducting a chain survey, you encounter a large pond obstructing the measurement. Explain how to overcome this obstacle? Justify your method.

### 3. Question Paper: BASIC SURVEYING

**Government of Karnataka  
Department of Technical Education  
Board of Technical Examinations**

Model Question Paper

**Course: Basic Surveying**  
**Time: 3 HRs**

**Course Code: 25CE22I**  
**Max. Marks :100**

**Instructions:**

- For **Part A**, only the first attempted answers will be considered for evaluation.
- Use neat sketches/diagrams wherever necessary.
- Assume data wherever required and state them clearly.
- All parts are **compulsory**, except where choice is provided.
- All dimensions are in metric units unless stated otherwise.

**PART – A**

**I. Multiple Choice Questions ( $15 \times 1 = 15$  Marks)**

1. Which of the following is a primary classification of surveying?  
a) Plane b) Hydrographic c) Cadastral d) Topographic surveying
2. The method used for chaining on sloping ground is:  
a) Reciprocal ranging b) Stepping method c) Compass method d) Taping over slope
3. Which of the following is NOT a type of tape used in chain surveying?  
a) Invar tape b) Linen tape c) Steel tape d) Measuring wheel
4. A base line is defined as:  
a) A line joining tie stations  
b) Shortest line on the field  
c) Main and longest line of triangulation  
d) Line used to avoid obstacles
5. True bearing is measured with respect to:  
a) Arbitrary meridian b) True north c) Grid meridian d) None
6. Which method of levelling is suitable for long distances across rivers?  
a) Fly levelling b) Simple levelling c) Reciprocal levelling d) Profile levelling
7. Local attraction is detected by:  
a) Measuring slope b) staff readings c) Comparing fore and back bearings d) None of these
8. Rise and Fall method is used to:  
a) Chain lengths b) Correct bearings c) Calculate reduced levels d) Locate contours
9. The standard length of a metric chain is:  
a) 10 m b) 20 m c) 30 m d) All of the above
10. Contour lines spaced closely indicate:  
a) Steep slope b) Gentle slope c) Flat terrain d) Cliff

11. Cross staff is used for:
  - a) Setting compass
  - b) Levelling
  - c) Setting out perpendicular offsets
  - d) None
12. The magnetic declination changes:
  - a) With time only
  - b) With location only
  - c) With both time and location
  - d) Never
13. Optical square is used to:
  - a) Measure angles more than  $90^\circ$
  - b) Set out right angles
  - c) Measure altitude
  - d) Plot graphs
14. Which line checks the accuracy of the chain survey framework?
  - a) Tie line
  - b) Check line
  - c) Base line
  - d) Offset
15. The prismatic compass is graduated:
  - a) From  $0^\circ$  to  $360^\circ$  clockwise
  - b) From  $0^\circ$  to  $180^\circ$  clockwise
  - c) From  $0^\circ$  to  $360^\circ$  anticlockwise
  - d) From  $0^\circ$  to  $180^\circ$  anticlockwise

## II. Fill in the Blanks ( $5 \times 1 = 5$ Marks)

(Choose from: Tie Station, Change Point, Optical Square, Local Attraction, Datum)

1. A fixed point on a line used to take offset is known as a \_\_\_\_\_.
2. A point where foresight and backsight are taken during levelling is called \_\_\_\_\_.
3. \_\_\_\_\_ is a reference surface to calculate elevations.
4. \_\_\_\_\_ affects compass readings due to nearby magnetic influences.
5. \_\_\_\_\_ is used to set out right angles in the field.

## PART – B

### I. Answer any FIVE ( $5 \times 2 = 10$ Marks)

1. Define surveying. List two main objectives.
2. What are the primary divisions of surveying?
3. Define benchmark. Name any two types.
4. Differentiate between true and magnetic bearing.
5. Define Intermediate Sight and fore sight in levelling.
6. The true bearing of a line is  $150^\circ 30'$ . If the magnetic declination in the area is  $4^\circ 15'$  West, calculate the magnetic bearing of the line.
7. Discuss any two advantages of contour maps
8. Mention the different methods of contouring

## PART – C

### I. Answer any FIVE ( $5 \times 3 = 15$ Marks)

1. Explain principles of surveying with examples.
2. Discuss any five conventional signs used in surveying with neat sketches.
3. Describe the procedure of temporary adjustment of a dumpy level.
4. Explain any three sources of errors in compass surveying.
5. Define technical terms used in levelling -RL, B.S., F.S.
6. Convert FB to B.B for followings bearings a)  $125^\circ 15'$  b)  $300^\circ$  c)  $180^\circ$  d)  $S45^\circ W$
7. Differentiate between Contour intervals and Horizontal Equivalent

- Draw the contour patterns of a) Ridge & Valley b) Steep and gentle slopes c) Hill

### PART – D (Section I)

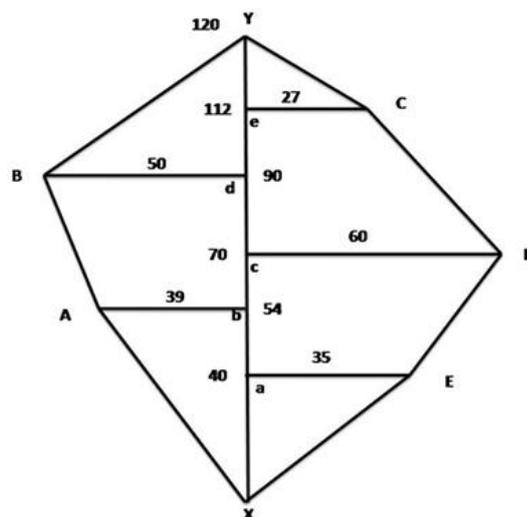
#### I. Answer any FIVE ( $5 \times 5 = 25$ Marks)

- Describe the procedure of chain triangulation with a neat sketch.
- Differentiate between perpendicular and oblique offsets. When would an oblique offset be preferred or necessary?
- Convert the following reduced bearings to whole circle bearings:  
a)  $S45^\circ E$  b)  $N30^\circ W$  c)  $S60^\circ W$  d)  $N75^\circ E$
- Give in table, the differences between Prismatic compass and Surveyor's compass.
- The following staff readings were observed during a simple levelling operation in order: 1.500, 1.755, 2.050, 2.150, 1.850, 1.250, 0.955. The first reading was taken on a benchmark of RL = 100.000 m. Tabulate readings using Rise and Fall Method
- Explain the method of reciprocal levelling. When is it required?
- Describe the methods of locating contours with neat sketches.
- Describe the Uses of Contour Maps

### PART – D (Section II)

#### I. Answer any THREE ( $3 \times 10 = 30$ Marks)

- The following consecutive readings were taken with a level 1.904, 2.653, 3.906, 4.026, 1.964, 1.702, 1.592, 1.261, 2.542, 2.006 and 3.145. The instrument was shifted after 4th and 7th readings. The 1st reading was taken on a staff held on B.M of R.L of 100m. Calculate the R.L of points by using Height of Instrument.
- A closed compass traverse gave the following bearings:  $AB = 80^\circ$ ,  $BC = 160^\circ$ ,  $CD = 240^\circ$ ,  $DA = 320^\circ$  Detect local attraction and correct the bearings.
- Illustrate different characteristic of contours and explain each one of them
- Calculate the total area of given measured land area.



- While conducting a detailed survey for a new bridge construction project spanning a wide river. Identify and justify the most suitable primary division of surveying you would employ for this project, explaining why other divisions might be less appropriate.

