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இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2025
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2025
General Certificate of Education (Adv. Level) Examination, 2025

සිවිල් තාක්ෂණවේදය I
குடிசார்த் தொழினுட்பவியல் I
Civil Technology I

14 E I

පැය දෙකයි
இரண்டு மணித்தியாலம்
Two hours

Instructions:

- *Answer **all** the questions.*
- *Write your **Index Number** in the space provided in the answer sheet.*
- *Instructions are given in the back of the answer sheet. Follow them carefully.*
- *In each of the questions **1** to **50**, pick one of the alternatives from (1), (2), (3), (4), (5) which is **correct** or **most appropriate** and **mark your response on the answer sheet with a cross** (×) in accordance with the instructions given in the back of the answer sheet.*
- *Use of calculators is not allowed.*

1. What is the SI unit used for electrical power?
(1) A (2) V (3) J (4) W (5) Nm

2. The item which is needed in domestic electrical installations is,
(1) ammeter. (2) voltmeter. (3) socket outlet. (4) multimeter. (5) oscilloscope.

3. Select the answer with correct symbols for resistor, capacitor and diode in order.

(1)  ,

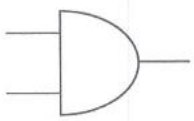
(2)  ,

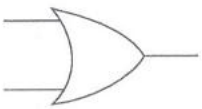
(3)  ,

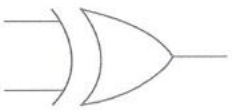
(4)  ,

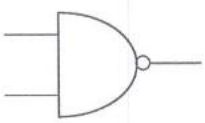
(5)  ,

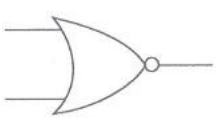
4. Out of the below circuits, which logic gate's output is high only when both inputs are logic '1'?

(1) 

(2) 

(3) 

(4) 

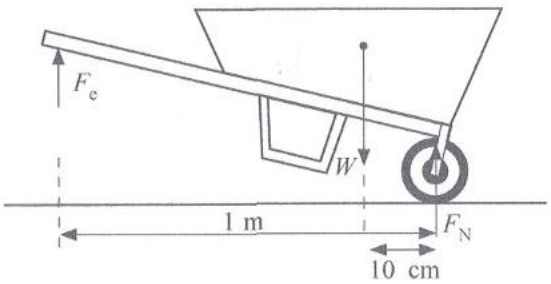
(5) 

[See page two

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- Answer the question **5** and **6** using below figure.

A wheelbarrow used to transport sand in a construction site is shown in the figure. The combined weight (W) of the wheelbarrow and sand is 40 kg. The combined weight has a perpendicular distance of 10 cm and the force generated from hand (F_e) has a perpendicular distance of 1 m from the axis of the wheel as shown in the figure. Consider acceleration of gravity as 10 m s^{-2}.



5. What is the upward force (F_e) that should be applied by the operator to lift the load?
(1) 40 N (2) 80 N (3) 100 N (4) 200 N (5) 400 N

6. Force exerted by the wheel (F_N) on the ground is,
(1) 40 N. (2) 200 N. (3) 360 N. (4) 400 N. (5) 440 N.

7. Consider the following statements.

A - Coarse aggregate is not used in cement blocks.
B - Hollow blocks are lighter than solid blocks.
C - Fine aggregate should be carefully selected for making cement blocks.
D - Cement to sand ratio 1:15 can be recommended.

Which of the above statements are true regarding solid and hollow cement blocks?
(1) *A*, *B* and *C* only. (2) *A*, *B* and *D* only. (3) *A*, *C* and *D* only.
(4) *B*, *C* and *D* only. (5) All *A*, *B*, *C* and *D*.

8. Consider the following statements about deceleration.

A - Its SI unit is m s^{-2}.
B - It is a scalar quantity.
C - It can be calculated by rate of change of velocity.
D - It has the same units as acceleration.

Out of the above, which statements are correct related to deceleration?
(1) *A*, *B* and *C* only. (2) *A*, *B* and *D* only. (3) *A*, *C* and *D* only.
(4) *B*, *C* and *D* only. (5) All *A*, *B*, *C* and *D*.

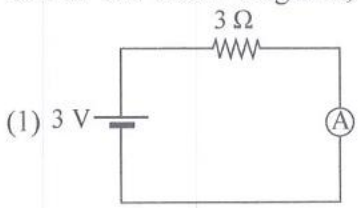
9. A student has calculated the length and the width of his land as 72 m × 23 m, respectively. His grandfather wants to know the extent in Perches. The correct extent of the land is,
(1) 65.47 Perch. (2) 66.24 Perch. (3) 74.23 Perch.
(4) 86.76 Perch. (5) 112.65 Perch.

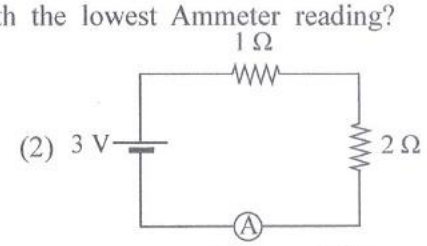
10. A surveyor has measured the distance between point *A* and *B* using the Gunter's chain as 2 chains and 75 links. However, a technician wants to find the distance in meters. The correct value for this distance is,
(1) 49.71 m. (2) 55.32 m. (3) 62.51 m. (4) 72.15 m. (5) 74.97 m.

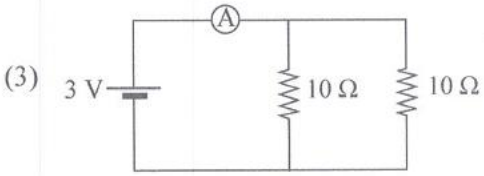
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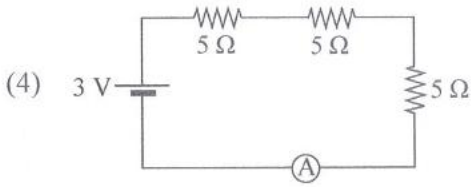
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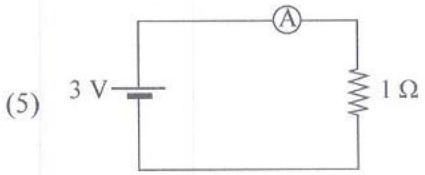
11. Out of the below diagrams, which is the circuit with the lowest Ammeter reading?

(1) 

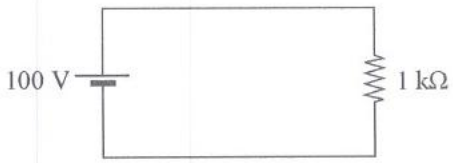
(2) 

(3) 

(4) 

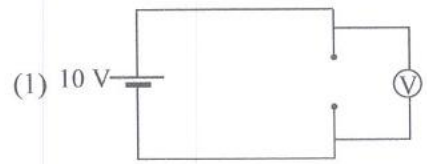
(5) 

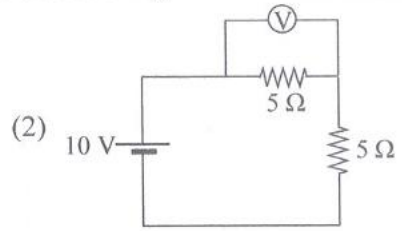
12. A student has tested the below circuit. What is the power dissipation across the resistor?

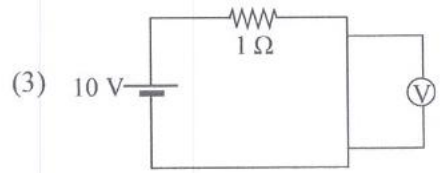


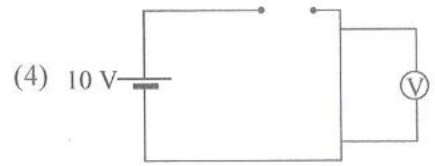
(1) 1 W
(2) 10 W
(3) 100 W
(4) 200 W
(5) 500 W

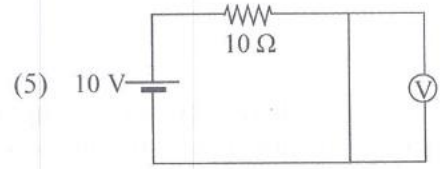
13. Out of the below circuit diagrams, which is the circuit with the highest voltmeter reading?

(1) 

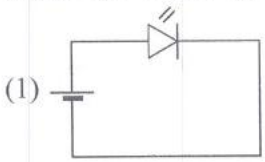
(2) 

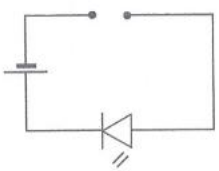
(3) 

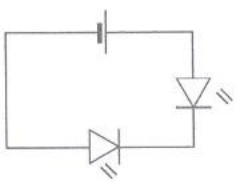
(4) 

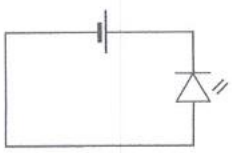
(5) 

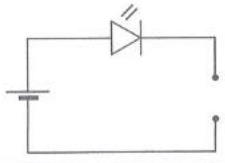
14. Select the circuit in which the LED is ON.

(1) 

(2) 

(3) 

(4) 

(5) 

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15. Consider the below steps.
    A - Switching off the main switch of the power supply.
    B - Usage of foam spray fire extinguisher to control fire.
    C - Usage of Carbon dioxide fire extinguisher to control fire.
    Out of the above steps, what are the step/steps that should be taken to control the fire erupted at an office in a construction site?
    (1) *B* only. (2) *C* only. (3) *A* and *B* only.
    (4) *A* and *C* only. (5) All *A*, *B* and *C*.

16. Consider the following statements.
    A - Gypsum is used for manufacturing Plaster of Paris.
    B - Portland cement is a compound that contains calcium, silica, alumina and iron oxide.
    C - Bitumen is petroleum by-product used for road surfacing.
    D - Fly ash can be used as a pozzolanic material in cement concrete.
    Which of the above statements are true about commonly used construction materials?
    (1) *A* and *B* only. (2) *B* and *D* only. (3) *A*, *B* and *C* only.
    (4) *A*, *C* and *D* only. (5) All *A*, *B*, *C* and *D*.

17. Consider the following statements.
    A - Coefficient of static friction is higher than coefficient of dynamic friction.
    B - Friction is not always beneficial to human life.
    C - When the weight of an object increases, frictional force is increased.
    Which of the above statement/s is/are true regarding friction?
    (1) *A* only. (2) *A* and *B* only. (3) *A* and *C* only.
    (4) *B* and *C* only. (5) All *A*, *B* and *C*.

18. What is the choice that states the four-strokes of a petrol engine in order?
    (1) Intake→Compression→Expansion→Cooling
    (2) Intake→Expansion→Compression→Exhaust
    (3) Compression→Expansion→Exhaust→Cooling
    (4) Intake→Compression→Power→Exhaust
    (5) Intake→Power→Expansion→Exhaust

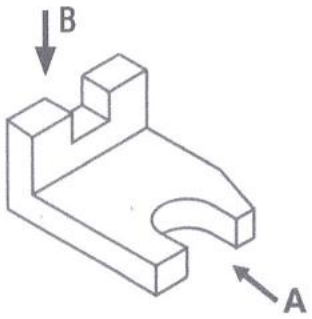
19. The main function of a gearbox of an automobile is to,
    (1) increase the speed of the engine.
    (2) maintain constant torque at all speeds.
    (3) vary torque and speed according to driving requirements.
    (4) convert linear motion to rotary motion.
    (5) reduce fuel consumption of the vehicle.

20. When a block rests on a horizontal surface and a gradually increasing horizontal force is applied, which of the following statements correctly describes the nature of friction before the block starts to move?
    (1) The frictional force remains constant irrespective of the applied force.
    (2) The frictional force decreases as the applied force increases.
    (3) The frictional force increases with the applied force up to a certain maximum value.
    (4) The frictional force acts in the direction of the applied force.
    (5) The frictional force becomes zero just before the block moves.

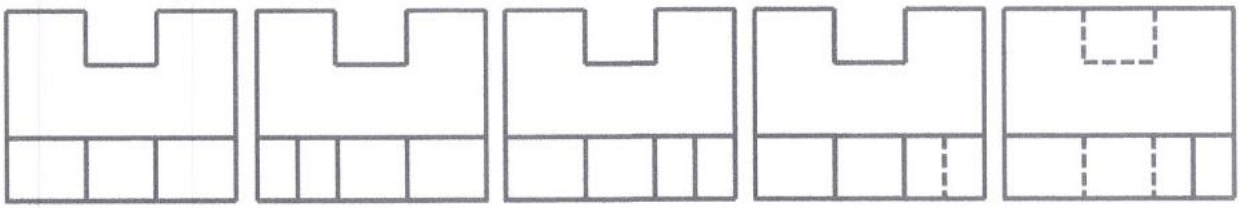
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- Answer question No. **21** and **22** referring to the isometric view of the machine component shown in the figure.

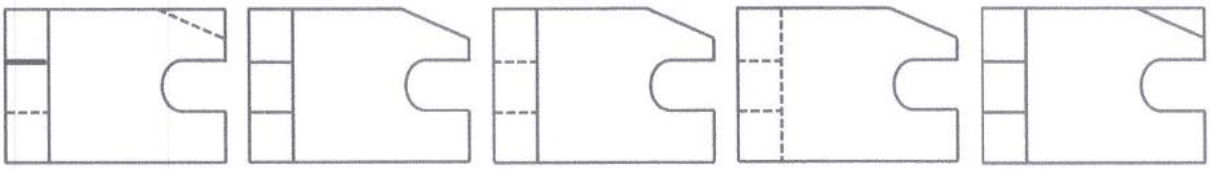


21. What is the correct orthogonal projection when viewed from the direction of arrow **A**?



(1) (2) (3) (4) (5)

22. What is the correct orthogonal projection when viewed from the arrow **B**?

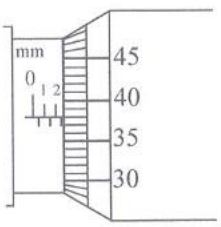


(1) (2) (3) (4) (5)

23. When designing a chair to be used in a computer laboratory, which of the following anthropometric measures is most critical for determining the seat height?

(1) Shoulder height
(2) Elbow rest height
(3) Thigh clearance
(4) Popliteal height
(5) Eye height

24. The figure shows a micrometer screw gauge measurement of a machine component.



What is the reading?

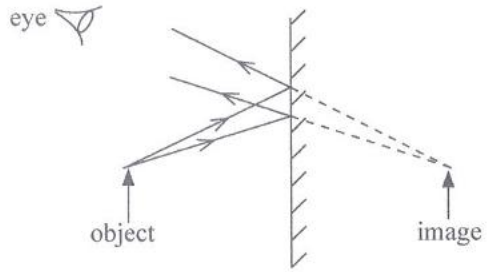
(1) 2.38 mm (2) 2.88 mm (3) 3.38 mm (4) 3.88 mm (5) 5.38 mm

[See page six

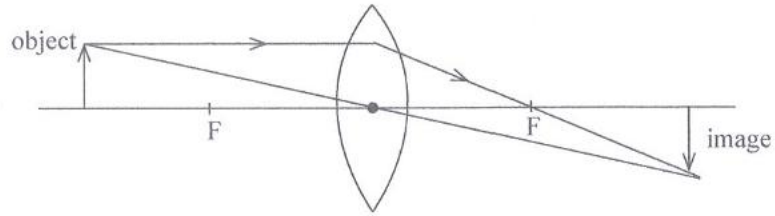
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25. A group of students is studying on behaviour of light rays. According to their observations, following line diagrams are shown below. Which of the below diagrams is **incorrect**?

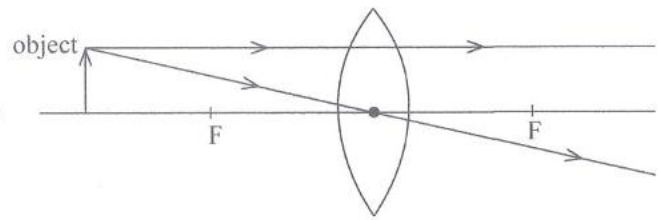
(1)



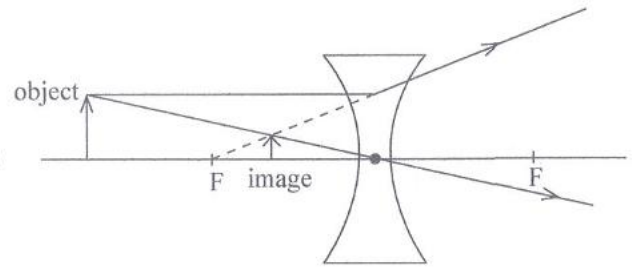
(2)



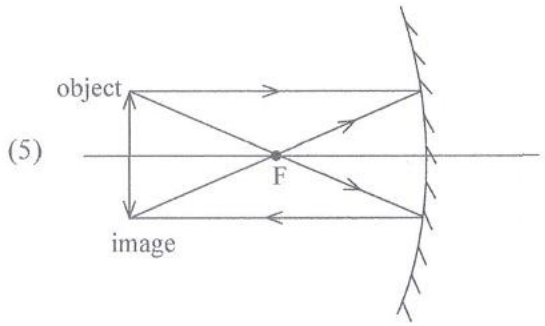
(3)



(4)



(5)



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26. Consider the following structures/structural elements.

A - A boundary wall having a height of 1.5 m.

B - A balcony of a house having extended width of 0.9 m beyond the building line.

C - An extended roof having an extended width of 1.8 m beyond the building line.

As per building regulations of Sri Lanka, what are the structures/structural elements that can be constructed beyond the building line of a land?

(1) *A* only. (2) *B* only. (3) *C* only.
(4) *A* and *B* only. (5) All *A*, *B* and *C*.

27. Consider the following statements.

A - Buildings having (G+3) floors are considered as Type "A" buildings.

B - Single storey houses having total floor area of 250 m^2 with a single blind wall along a boundary of the land can be considered as a Type "C" buildings.

C - No certifications from a charted architect and a structural engineer are required for building plans categorized under category "B".

D - Even a three storey (G+2) building is considered as a Type "A" building if the total height of that building is 15 m.

Out of the above, which statements are **incorrect** regarding in building regulations?

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

28. A client is expecting to complete construction of 115 mm block work at a cost of Rs. 3800 per m^2. Cost for the materials (Block, cement, sand etc) is Rs. 2750 per m^2. The skilled and unskilled labour requirements to complete 1 m^2 of wall is 1 hr and 2 hrs respectively. Select the possible daily wages that shall be agreed upon with skilled and unskilled labourers to complete this work under the expected cost? (You can consider 8 hours = 1 labour day)

(1) Rs. 3050, Rs. 2500 (2) Rs. 3200, Rs. 2750 (3) Rs. 3300, Rs. 2500
(4) Rs. 3300, Rs. 2650 (5) Rs. 3500, Rs. 2600

29. It is required to apply internal painting for a rectangular security hut having 225 mm width walls. Center line dimension of the security hut walls is 4.25 m×3.1 m. Wall height to ceiling level is 2.9 m. This hut is having two windows of 1.2 m×0.6 m and door of 2.2 m×0.9 m. The internal painting quantity for the hut is,

(1) 36.21 m^2. (2) 36.6 m^2. (3) 38.52 m^2. (4) 39.21 m^2. (5) 41.82 m^2.

30. It is required to install taps for a wash basin of a domestic toilet and for a tap post of a public bus stand. The most appropriate tap types for these two locations are,

(1) bib tap and pillar tap.
(2) push button tap and pillar tap.
(3) pillar tap and bib tap.
(4) pillar tap and push button tap.
(5) bib taps for both locations.

31. Consider the following statement regarding that a housing project that used Type 600 PVC pipes for wastewater lines and Type 1000 PVC pipes for water supply lines.

A - Usage of type 600 is not acceptable for wastewater lines as high water pressure can develop in such lines.

B - Usage type 1000 pipes for all water supply and wastewater lines is the standard practice in plumbing construction.

C - In general, wastewater is flowing under gravity in wastewater systems.

Which of the above statement/s is/are correct?

(1) *C* only. (2) *A* and *B* only. (3) *A* and *C* only.
(4) *B* and *C* only. (5) All *A*, *B* and *C*.

[*See page eight*

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32. Consider the following statements.
A - Existing ground surface can be used as the sub grade in certain cases.
B - Sub grade is bottom most layer of a road.
C - Strength of the Sub grade does not affect on thicknesses of other layers.
D - Sub grade should have a bearing capacity to bear all loads transferred from top layers.
Out of the above, which one is the **incorrect** statement/s regarding the sub grade of a road?
(1) *A* only. (2) *B* only. (3) *C* only.
(4) *D* only. (5) All *A*, *B*, *C* and *D*.

33. The most recommended Camber for a concrete road is,
(1) 1/25 to 1/20. (2) 1/30 to 1/34. (3) 1/48 to 1/30.
(4) 1/55 to 1/50. (5) 1/72 to 1/60.

34. It is needed to carry out a deep excavation for a foundation adjacent to a road. What is the most important step that shall be taken to avoid settlement of the adjacent road?
(1) Execution of excavations only in dry seasons.
(2) Imposing a speed limit for vehicles travelling on the road.
(3) Execution of excavation only using manual labour.
(4) Provision of necessary shoring for the edges of the excavation.
(5) Execution of dewatering during the excavation.

35. Standard size of a brick is,
(1) 215 mm×102.5 mm×65 mm.
(2) 210 mm×100 mm×50 mm.
(3) 225 mm×115.5 mm×75 mm.
(4) 225.5 mm×105 mm×55 mm.
(5) 200 mm×102.5 mm×70 mm.

36. Consider the following statements.
A - Air vents are necessary to avoid siphonage in water traps.
B - A float valve controls water entry into an overhead tank.
C - Trap seals in wash basins prevent foul gases from entering buildings.
D - GI pipes are less corrosion-resistant than UPVC pipes.
Out of the above, which statements is correct about domestic plumbing system?
(1) *A* and *C* only. (2) *B* and *D* only. (3) *A*, *B* and *D* only.
(4) *A*, *C* and *D* only. (5) All *A*, *B*, *C* and *D*.

37. Among following, which is the **incorrect** statement about sewerage systems?
(1) Manholes are provided at changes in direction or slope of a sewer line.
(2) A water seal in traps prevents entry of foul gases.
(3) Inverted siphons are laid under obstructions like rivers or roads.
(4) Minimum self-cleansing velocity in sewers is less than 0.3 $m\,s^{-1}$.
(5) Vent pipes are provided to release gases from sewerage systems.

38. Consider the following statements.
A - Chlorination is the most common method for disinfection.
B - Sedimentation helps in removing suspended solids.
C - Coagulation and flocculation assist in setting fine particles.
D - Aeration increases the concentration of dissolved oxygen in water.
Which of the above statements are true about water treatment processes?
(1) *A* and *C* only. (2) *A* and *D* only. (3) *B* and *C* only.
(4) *A*, *B* and *C* only. (5) All *A*, *B*, *C* and *D*.

[*See page nine*

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39. Which of the following internal forces are present in a masonry arch bridge?
(1) Bending moment and tensile force
(2) Bending moment and compressive force
(3) Tensile force and shear force
(4) Compressive force and tensile force
(5) Bending moment only

40. Allowable bearing capacity of a certain soil strata under drained situation is 200 kPa. Under saturated condition, it has been found that bearing capacity reduces 50% of its drained situation. What is the allowable axial load that column can carry if a square pad foundation of 1.0 m × 1.0 m is used in saturated condition?
(1) 50 kN (2) 100 kN (3) 200 kN (4) 400 kN (5) 600 kN

41. Concrete member of 100 mm^2 is subjected to 25 kN of axial force. The Young's modulus and the Poisson ratio of the concrete is 25 GPa and 0.2, respectively. Lateral strain of the concrete member is,
(1) 0.001. (2) 0.0002. (3) 0.004. (4) 0.02. (5) 0.04.

42. Municipal workers want to classify plastic waste that has been collected during the day. They have received large quantity of yoghurt cups. What is the polymer type they should select to categorize yoghurt cups?
(1) High density polyethylene
(2) Polyvinyl Chloride
(3) Low Density Polyethylene
(4) Polyethylene Terephthalate
(5) Polypropylene

43. As a technician, you have been consulted by the plumbers about the delivery pressure of bidet showers of washrooms. There is a correct range of pressure that should exist at bidet shower. What is the correct range of pressure that should exist at the point of delivery for bidet showers used in washrooms?
(1) 30 to 40 psi. (2) 40 to 60 psi. (3) 80 to 100 psi.
(4) 100 to 120 psi. (5) 120 to 140 psi.

44. Which one of the following statements is true about offsets in chain surveying?
(1) Offsets are not allowed in chain surveying
(2) Offsets are inaccurate if the measurement exceeds 10 m
(3) The maximum length allowed in offsetting in chain surveying is 15 m
(4) Offsets are only used in taking details of buildings
(5) Offsets are only used in primary sketching

45. Levelling exercise which uses a staff with a least count of 5 mm, surveyors have to set up the instrument at four locations. What is the maximum statistical error allowed in this surveying exercise?
(1) 5 mm (2) 10 mm (3) 15 mm (4) 20 mm (5) 25 mm

46. In angle measurements using theodolites, surveyors measure an angle for 4 consecutive times. Which one of the following statements is **false** about this measurement adopted in angle measurements?
(1) To prevent pond bubble error
(2) To prevent plate level error
(3) To prevent trunnion axis error
(4) To prevent horizontal axis error
(5) To prevent vertical index error

[*See page ten*

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47. Consider the following statements regarding fine aggregates.
A - Fineness is a major consideration when selecting suitable fine aggregate type for plastering work.
B - Fine aggregates should be free from shells and mud particles.
C - Specific weight of the fine aggregate is a very important criterion for concrete work.
D - Fine aggregates dredged from sea can be used for concrete work.
Which of the above statements is true?
(1) *A*, *B* and *C* only. (2) *A*, *B* and *D* only. (3) *A*, *C* and *D* only.
(4) *B*, *C* and *D* only. (5) All *A*, *B*, *C* and *D*.

48. Consider the following statements regarding artificial boards.
A - Hard boards can be used as load bearing walls.
B - Artificial boards can be used for concrete formwork.
C - Artificial boards absorb water vapour in air.
D - Warping is a major consideration in artificial boards.
Which of the above statements is true?
(1) *A*, *B* and *C* only. (2) *A*, *B* and *D* only. (3) *A*, *C* and *D* only.
(4) *B*, *C* and *D* only. (5) All *A*, *B*, *C* and *D*.

49. Approximate load that 10 mm tor steel bar can carry before its yielding is,
(1) 24 kN. (2) 36 kN. (3) 45 kN. (4) 58 kN. (5) 68 kN.

50. Consider the following statements regarding mass concrete.
A - Concrete grade should be more than 25 MPa.
B - Controlled amount of construction waste can be used as a replacement to aggregates.
C - Mass concrete is normally used for concrete work in building ground floors.
D - Compaction and curing are needed after mass concrete placement.
Which of the above statements is true?
(1) *A*, *B* and *C* only. (2) *A*, *B* and *D* only. (3) *A*, *C* and *D* only.
(4) *B*, *C* and *D* only. (5) All *A*, *B*, *C* and *D*.

* * *

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Price of an unskilled labour per day = Rs. 2,700

Price of water $1m^3$ = Rs. 2,000

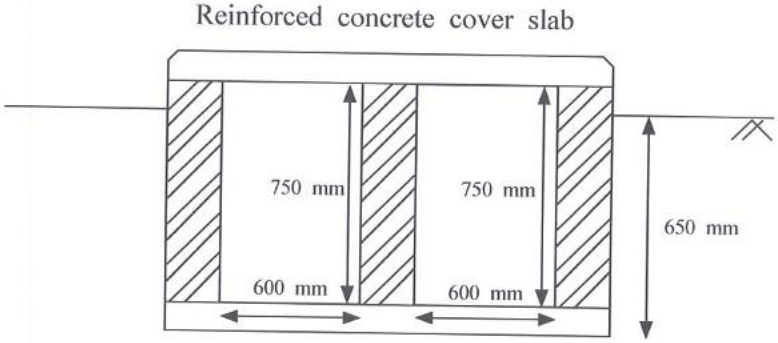
For other miscellaneous cost, it is required to add additional Rs. 900 per m^3.

(i) Calculate the basic unit rate for 1:2:4 (20 mm) concrete.

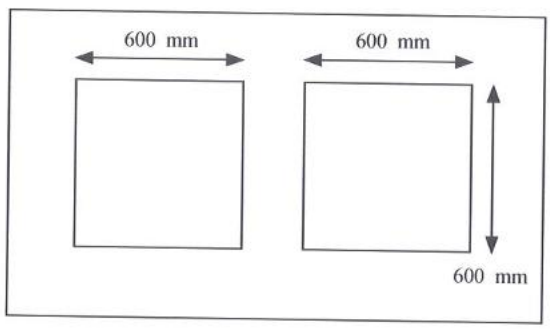
(ii) The management of your company wishes to reduce the estimated unit rate determined in part (i) as they wish to make more profit from concreting work since a considerably large concrete volume will have to be placed in this project. Describe the steps that can be taken to reduce the unit price of concrete with necessary justifications.

(You can make any rational assumptions as necessary in calculations, but those assumptions should be clearly stated.)

(b) Figure shows a sectional elevation and a plan of a proposed twin manhole for a project. Internal plan dimensions of each manhole is 600 mm × 600 mm. Internal height of the manhole is 750 mm. It has 75 mm thick mass concrete base and 75 mm thick reinforced concrete cover slab as it can be observed in the figure. It has to be provided reinforcements of T10@150 cc both ways for the cover slab. All walls are constructed as 225 mm (9") brick walls. Excavation depth for the manhole is 650 mm. It is required to construct five (05) such manholes in the project.



SECTIONAL ELEVATION



PLAN

Calculate the quantities of the following items as per the standard procedure of SLS 573.

(i) 225 mm brick walls

(ii) 75 mm concrete base

(iii) Reinforcements for cover slabs

(c) If 1:2:4 (20 mm) concrete is used for the construction of bases and cover slabs of the manholes, and 225 mm (9") brick for the construction walls of manholes,

(i) Calculate the approximate number of bricks required for construction of walls of these manholes.

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(ii) Calculate the quantities of cement and sand required for casting of bases and cover slabs of these manholes.

(You can make any rational assumptions as necessary in calculations, but such assumptions should be clearly stated)

9. A 3 m long metal bar of rectangular cross-section of 20 mm × 30 mm is subjected to an axial tensile load of 50 kN. The metal bar should follow the conditions given below.

(a) The bar should work under elastic behaviour only.

(b) The maximum elongation is 3 mm.

(i) Determine the axial stress

(ii) Determine axial strain at the maximum elongation fo 3 mm

(iii) Table below gives engineering properties of three materials. Considering the details of the table, select most suitable material for the metal bar.

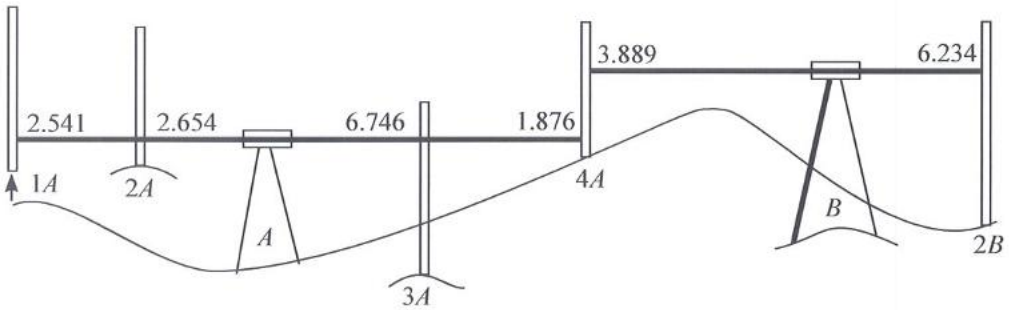
Material	Young Modulus (MPa)	Yield stress (MPa)	Ductility (%)
1040 steel	207000	350	30
2024 Al alloy	72000	100	18
70/30 Brass	110000	75	70

10. (a) Briefly explain the following two methods for error checking in levelling.

Balanced sight distances

Double levelling

(b) The figure shows a levelling performed to get reduced levels at indicated points. Initially, the levelling instrument is mounted at point *A* to take measurements and then transferred to point *B*. Staff readings are shown in the figure. The reduced level at point 2*A* is known as 300.000 m. Using rise and fall method, tabulate the readings and obtain the reduced levels of 1*A*, 3*A*, 4*A* and 2*B* points.



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இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2025
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2025
General Certificate of Education (Adv. Level) Examination, 2025

සිවිල් තාක්ෂණවේදය II
குடிசார்த் தொழினுட்பவியல் II
Civil Technology II

14 E II

පැය තුනයි
மூன்று மணித்தியாலம்
Three hours

අමතර කියවීම් කාලය - මිනිත්තු 10 යි
மேலதிக வாசிப்பு நேரம் - 10 நிமிடங்கள்
Additional Reading Time - 10 minutes

Use additional reading time to go through the question paper, select the questions you will answer and decide which of them you will prioritise.

Index No. : .....

Important :

* *This question paper consists of **12** pages.*
* *This question paper comprises **Parts** **A**, **B** and **C**. The time allotted for **all parts** is **three hours**. (Use of calculators is **not** allowed.)*

Part A - Structured Essay (08 pages)

* *Answer **all** the questions on this paper **itself**.*
* *Write your answers in the space provided for each question. Note that the space provided is sufficient for your answers and that extensive answers are not expected.*

Part B and C - Essay (04 pages)

* *Select **two** questions from each of the parts **B** and **C** and answer **four** questions only. Use the papers supplied for this purpose.*
* *At the end of the time allotted for this paper, tie the **three parts** together so that **Part A** is on the top of **Part B and C** before handing over to the supervisor.*
* *You are permitted to remove only **Parts B and C** of the question paper from the Examination Hall.*

For Examiner's Use Only

Part	Q. No.	Marks
A	1	
	2	
	3	
	4	
B	5	
	6	
	7	
C	8	
	9	
	10	
Total		

Total

In Numbers	
In Words	

Code Numbers

Marking Examiner 1	
Marking Examiner 2	
Checked by	
Supervised by	

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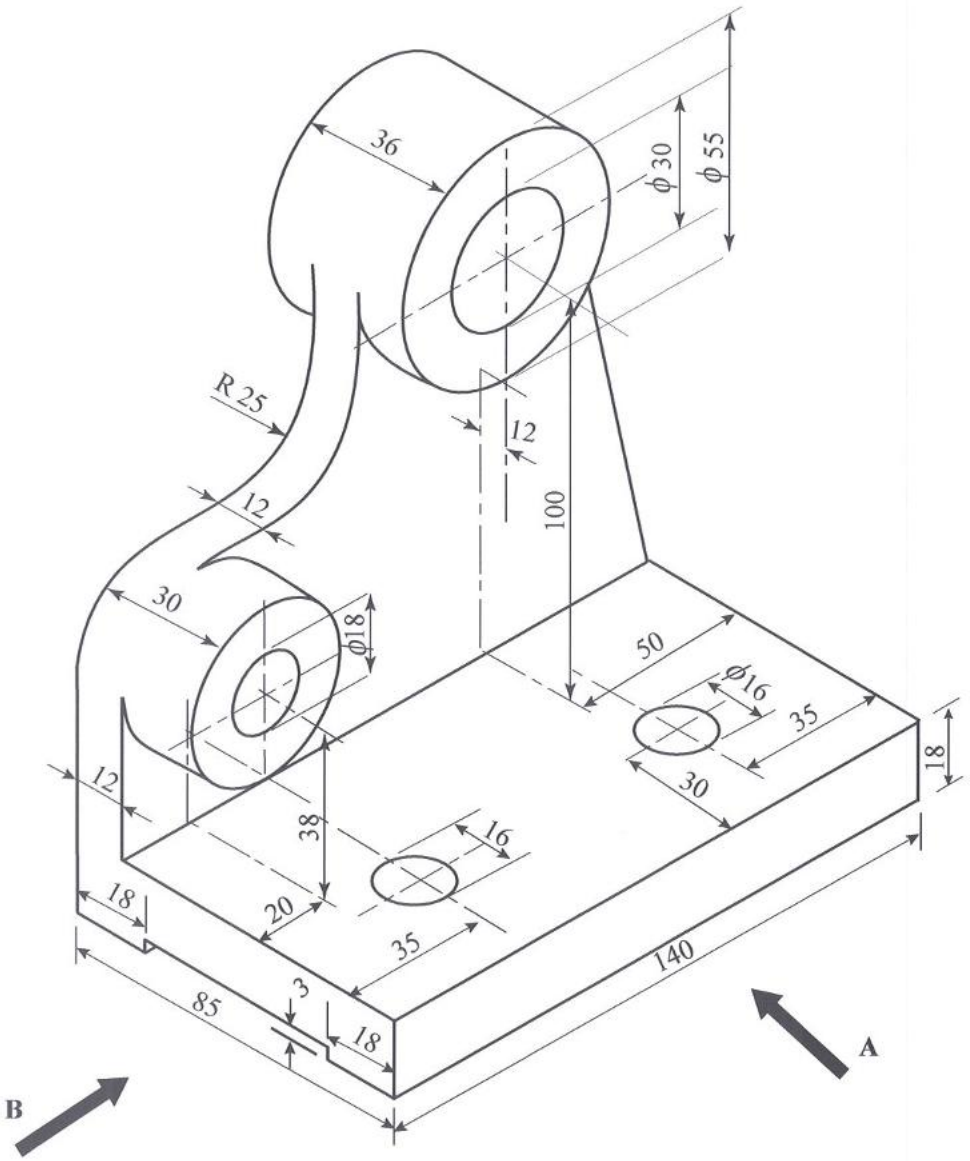
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PART A — Structured Essay

*Answer **all four** questions on this **paper itself**.*
*(Each question carries **10** marks)*

Do not write in this column

1. An isometric view of a machine component is shown in the figure. Draw the third-angle orthogonal projection views of the isometric view given in the figure using an appropriate scale and assuming missing dimensions. Indicate all relevant dimensions. Use the graph papers given on pages 3 and 4. All dimensions are in millimetres. The figure is **not** drawn into scale.



(a) Front elevation looking from **A**
(b) End elevation looking from **B**
(c) The plan view

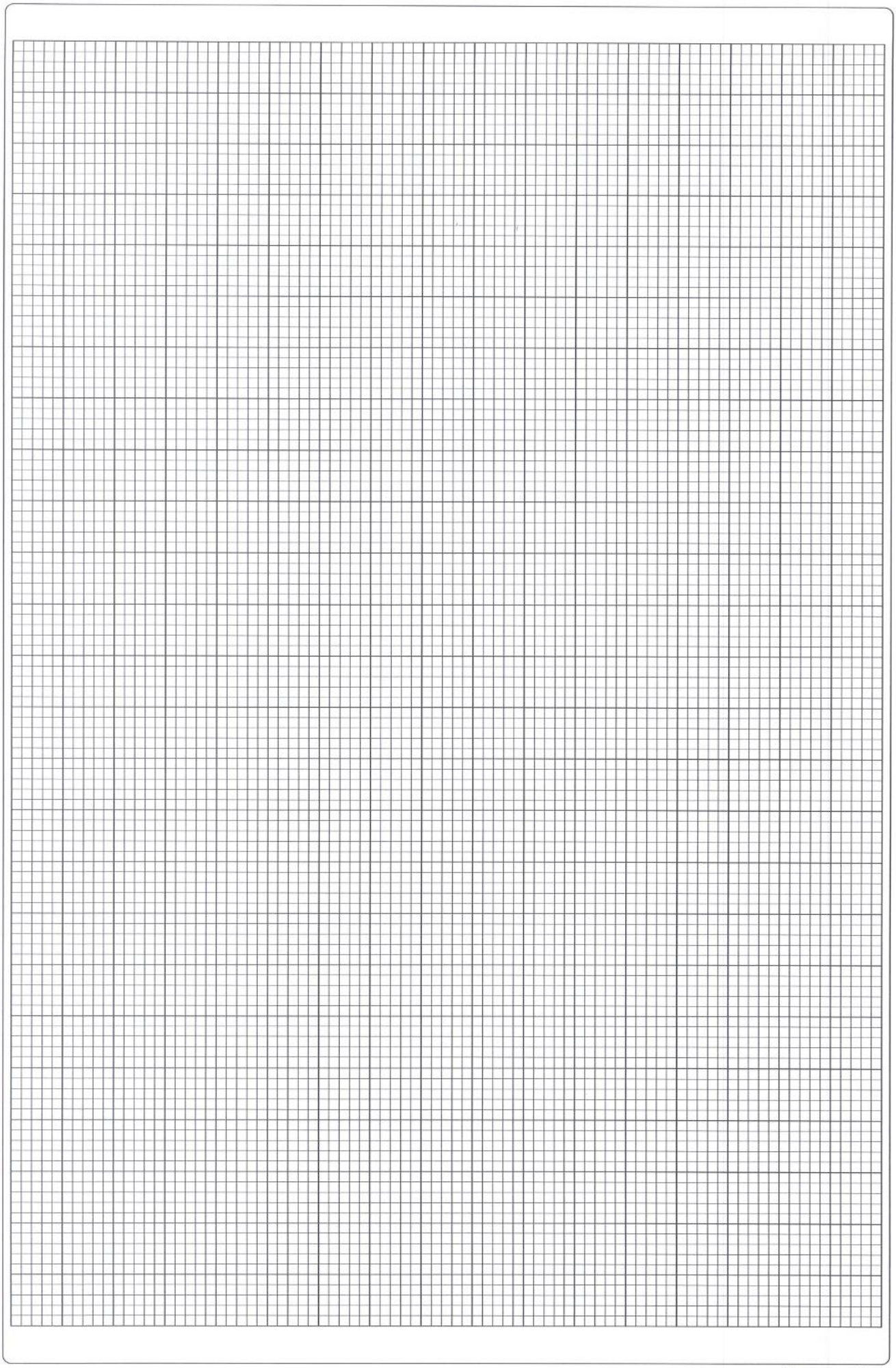
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2. An advanced level school student is planning to buy a desktop computer for his further studies.

(a) Write a specification for a desktop computer that suits for his purpose.

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(b) State **three** software for his desktop computer and their relevant purposes.

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(c) The student is planning to obtain internet facility to his desktop computer. State **two** suitable internet connection methods.

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(d) The Student is planning to follow an online course where real time interactions are required.

(i) State **two** hardware components required for this purpose.

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(ii) State a software required for attending online courses.

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3. A rapidly urbanizing town is planning to introduce a combined sewer system to manage both domestic wastewater and stormwater together with a treatment plant. The town is located near a reservoir that is used for irrigation and aquatic life conservation and the treated wastewater is supposed to be discharged into it.

(a) Describe **two** advantages and **two** disadvantages of using a combined sewer system compared to a separate system.

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(b) List **four** environmental quality parameters that must be monitored in the reservoir to ensure safe aquatic life.

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(c) Households connected to a combined sewer system have been asked to install simple pretreatment devices. Describe a filtration method using gravel, sand and charcoal for stormwater pretreatment at household level with a sketch.

[see page seven

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(d) Some houses on the outskirts cannot be connected to the combined sewer system. In such situations, describe **three** design considerations to ensure the safe operation of a septic tank at household level.

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(e) The proposed combined sewer system of the city will be at risk of flooding due to climate change impacts in the future. State **three** engineering measures that can be adopted to improve to the resilience of the sewer system to high-intensity rainfall.

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4. Rainwater harvesting has emerged as a sustainable solution to address water scarcity and climate challenges in developing countries.

(a) Discuss **three** major methods of rainwater harvesting commonly practiced in urban and rural areas. Explain how each method contributes to water conservation.

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(b) Describe **three** potential environmental challenges associated with rainwater harvesting systems (e.g., water quality, storage, structural impacts.)

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(c) Explain how rainwater harvesting can contribute to climate change adaptation, giving **three** practical examples relevant to developing countries.

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இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2025
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2025
General Certificate of Education (Adv. Level) Examination, 2025

සිවිල් තාක්ෂණවේදය II
குடிசார்த் தொழினுட்பவியல் II
Civil Technology II

14 E II

Essay

* *Select* ***two*** *questions from each of the* ***Parts*** **B** *and* **C** *and answer* ***four*** *questions only. (Each question carries* ***15*** *marks.)*

Part B

5. Many civil engineering structures have failed due to landslides in Sri Lanka in recent past. These failures have cost many human lives and economic losses.
   (a) State **two** reasons for landslides.
   (b) Explain why the landslides are most devastating natural calamity.
   (c) Explain **two** precautions that should follow when constructing houses in hilly areas.
   (d) Explain **one** precautionary measure in preparing surrounding land to prevent landslides and soil erosions in mountainous areas.

6. A team of graduates launched "ABC Leaf Eco Products", a start-up focused on producing biodegradable and compostable packaging materials using waste from the coconut industry, such as husks and coir dust. Their main goal was to provide an eco-friendly alternative to harmful single-use plastics which commonly used in hotels, restaurants and supermarkets.

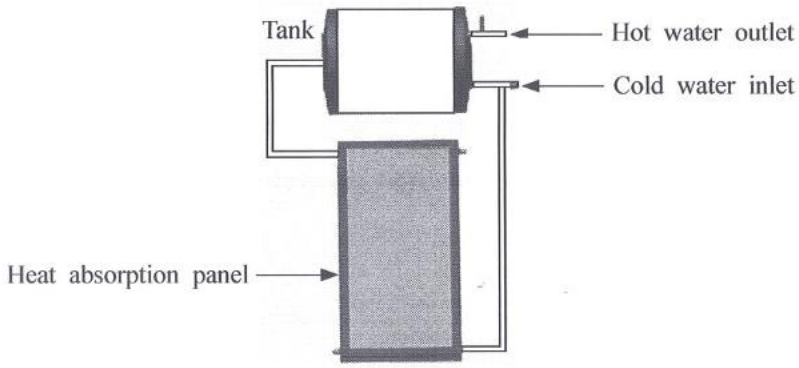
   By converting agricultural waste into valuable packaging, the project supports both environmental protection and rural livelihoods. Their products quickly gained national recognition for their quality, innovation and sustainability. This leads several major hotel chains and retail outlets to adopt to these products as a part of their green business and waste reduction initiatives.

   (a) Mention **two** innovative aspects of their products.
   (b) Analyze how entrepreneurship can promote environmental sustainability. Explain this under **three** aspects.
   (c) Describe under **two** points how the leadership and ethical qualities are used in this team.
   (d) Briefly describe **two** regional and **two** national returns expected from this project.

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7.



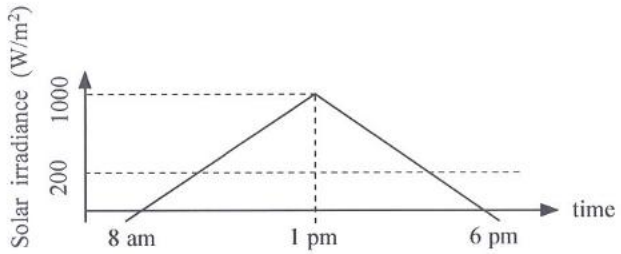
A solar water heating system is shown in the figure. Cold water enters the system and becomes hot when sunlight falls on it.

(a) Briefly describe the purpose of the cylindrical tank.

(b) Explain why the tank is installed above the solar heating panel.

(c) List **three** key factors that help the solar water heating panels to work efficiently.

(d) The following figure shows the solar irradiance (sunlight intensity) over a 10-hour period from 8.00 a.m. to 6.00 p.m.



(i) If the solar hot water heater efficiency is 40%, calculate the maximum possible daily thermal energy yield in kJ/m^2.

(ii) Determine the minimum size of hot water panel area required if the tank capacity is 300 *l* and expected temperature of the water at night is 60 °C Take ambient temperature as 25 °C. Assume that there is no water used in daytime and neglect the heat dissipation to the environment.

Part C

8. (a) Assume that you are working in a construction company. It is required to estimate a unit rate for 1:2:4 (20 mm) concrete work for a construction project. Following details are provided to you.

Material and labour requirements for mix and place 1m^3 of concrete

Cement bags (50 kg)	= 6.5
Sand	= 0.19 Cubes
Metal	= 0.33 Cubes
Water	= 200 litres
Skill labour - mixing and placing (Mason)	= 0.2 days
Unskill labour - mixing and placing (helper)	= 0.75 days

Prices

Price of a bag of cement (50 kg)	= Rs. 1800
Price of 1 cube of sand	= Rs. 22,500
Price of 1 cube of metal	= Rs. 10,500
Price of a skilled labour per day	= Rs. 3,600

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