AL/2015/14/E-I

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2015 අගෝස්තු
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2015 ஓகஸ்ற்
General Certificate of Education (Adv. Level) Examination, August 2015

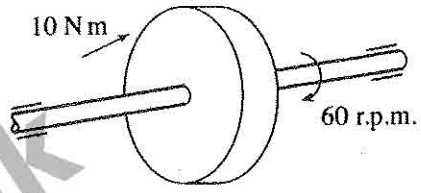
සිවිල් තාක්ෂණවේදය குடிசார்த் தொழினுட்பவியல் **Civil Technology**	I I I	**14 E I**	පැය දෙකයි இரண்டு மணித்தியாலம் ***Two hours***

Instructions:

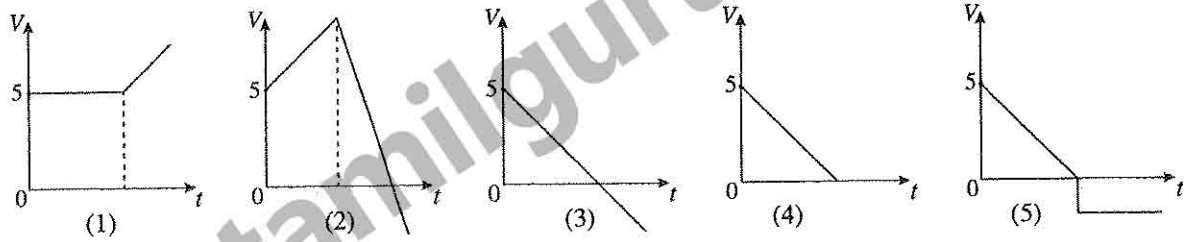
- ✻ *Answer **all** the questions.*
- ✻ *Write your **Index Number** in the space provided in the answer sheet.*
- ✻ *Use of calculators is not allowed.*
- ✻ *Instructions are given on the back of the answer sheet. Follow those carefully.*
- ✻ *In each of the questions **1** to **50**, pick one of the 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.*

1. Power, using basic units is
   (1) $kgms^2$ (2) Nm (3) Js^{-1} (4) kgm^2s^{-3} (5) $kgm^{-1}s$

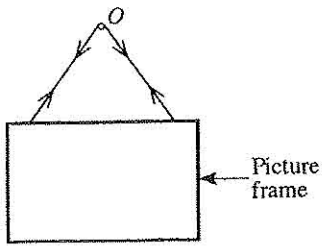
2. Figure shows a configuration of a rotor which is mounted on a shaft. The applied torque on the rotor is 10 Nm. The speed of rotation is 60 r.p.m. What is the power developed by the shaft?
   (1) (10π) W (2) (20π) W (3) (30π) W
   (4) (40π) W (5) (50π) W



3. A boy has projected an object by a velocity of 5 ms^{-1} from the height of 10 m. Which velocity-time graph represents the vertical motion of the object in air?



4. Figure shows a stable state of a picture frame which is hanging on a smooth point '*O*' by means of light string that passes through *O*.

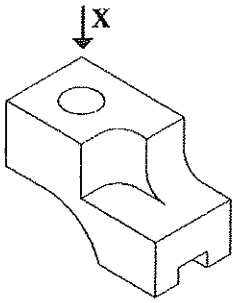


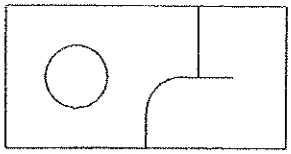
   Select the correct statement which describes the stable state.
   (1) The tension on both sides of the string is not same.
   (2) Sum of tensions on both sides of the string is equal to weight of the picture frame.
   (3) The moment of forces acting on frame about *O* is not zero.
   (4) The net resultant horizontal component of the tension on the frame is non zero.
   (5) The line of action of weight of the picture frame passes through point *O*.

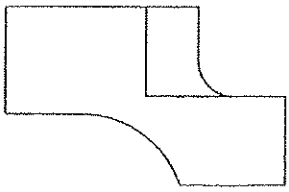
5. Solar energy is a combination of several types of energy. Some of those types are given below.
   A - Heat energy *B* - Magnetic energy
   C - Light energy *D* - Chemical energy
   Which of the above energy types are directly acquired from solar energy for **daily usage**?
   (1) *A* and *B* only (2) *A* and *C* only (3) *A* and *D* only (4) *B* and *C* only (5) *B* and *D* only

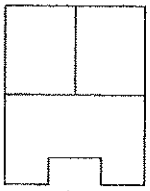
[See page two

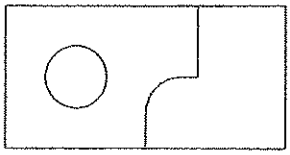
6. Isometric view of an object is given in figure below.
Which answer gives the correct view when looking from direction **X**?
(Ignore hidden lines)

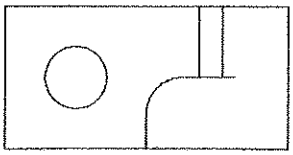



(1)

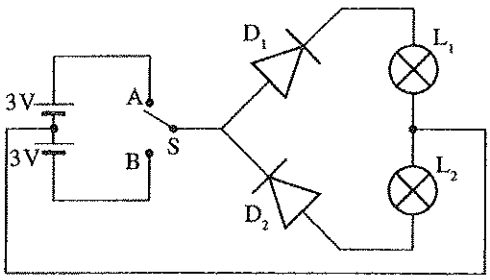

(2)


(3)

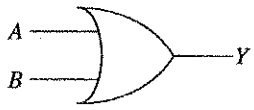

(4)

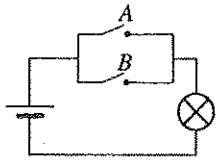

(5)

7. Figure shows a circuit used to switch on two lamps. When S switch is directed to A,
(1) only D_1 diode is forward biased and L_1 lamp is on.
(2) only D_2 diode is forward biased and L_2 lamp is on.
(3) both D_1 and D_2 diodes are forward biased and both L_1 and L_2 lamps are on.
(4) both D_1 and D_2 diodes are reversed biased and both L_1 and L_2 lamps are off.
(5) D_1 diode is forward biased and L_2 lamps is on.

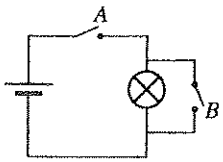


8. Select the correct circuit diagram that represents the operation of logic gate given in the Figure below.

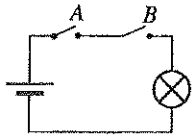




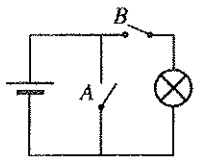
(1)



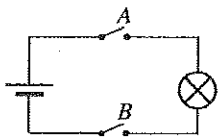
(2)



(3)

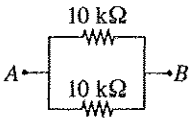


(4)

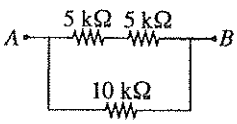


(5)

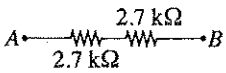
9. Which of the following resistor arrangements has the highest resistance between points *A* and *B*?



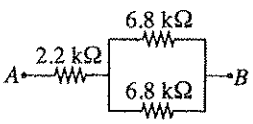
(1)



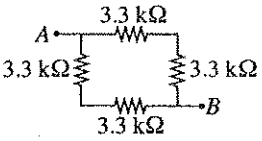
(2)



(3)

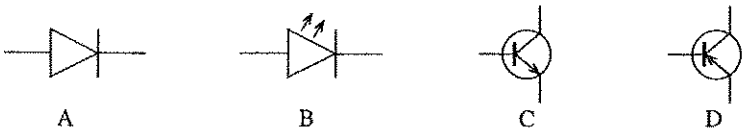


(4)



(5)

10. Select the answer which gives respectively the electronic component represented by the symbols given below.


A B C D

(1) Rectifier diode, Light emitting diode, PNP transistor, NPN transistor
(2) Light emitting diode, Rectifier diode, NPN transistor, PNP transistor
(3) Rectifier diode, Light emitting diode, NPN transistor, PNP transistor
(4) Light emitting diode, Rectifier diode, PNP transistor, NPN transistor
(5) NOT gate, Light emitting diode, NPN transistor, PNP transistor

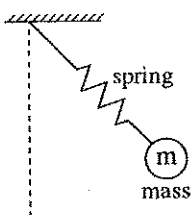
[*See page three*

11. Following statements are related to the use of a gas cooker in a kitchen in the early morning.
A - Before turning the gas cooker on open the window.
B - Make sure gas leakages are not present.
C - If smell of the gas is felt do not turn on the gas cooker.
D - Wait till the flame to come after ignition occurs.
Which statements are correct if safety aspects are considered?
(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) *A*, *B*, *C* and *D* all

12. A coconut tree slanted towards a building has been tied up by a steel wire. What is the material property that should be considered to study the breaking of the wire?
(1) Malleability. (2) Ductility. (3) Tensile strength.
(4) Elasticity. (5) Compressive strength.

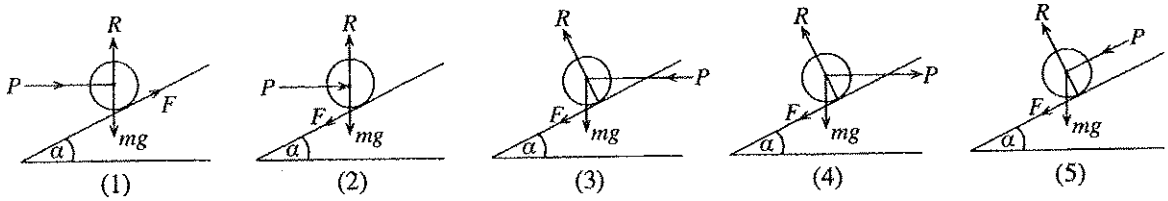
13. Frictional effect can be seen frequently in various day-to-day applications. Select the **inappropriate** statement about friction from the following statements.
(1) Friction force is proportional to the normal force.
(2) Friction is the force resisting the relative motion of two surfaces.
(3) Static and dynamic are two forms of friction.
(4) Friction force can be changed by altering surface finish.
(5) Friction always creates negative outcome for the expected result.

14. Figure shows a spring-mass system. One end of the spring is connected to a fixed point and mass m is attached at the other end. What forms of energy can be identified on the above system?
(1) Kinetic energy only.
(2) Kinetic and potential energy only.
(3) Potential and strain energy only.
(4) Kinetic, potential and gravitational energy only.
(5) Kinetic, potential and strain energy only.



15. What is the **incorrect** statement regarding mirrors and lenses?
(1) Magnifying glass is a convex lens which produces a magnified image of an object.
(2) Convex mirrors are used in side mirrors of cars to obtain narrow view of field.
(3) Concave mirrors reflect light inward to one focal point.
(4) Concave mirrors are used in vehicle headlights.
(5) Concave lenses diverge the light and always produce virtual image.

16. From the following figures, select the figure which represents the correct direction of forces, when the object tends to move in upward direction. Following notations are applied.
R: Reaction force, *P*: Effort, *mg*: Self weight, *F*: Friction force



17. Select the list which includes only the components used for house wiring circuits?
(1) Residual Current Circuit Breaker (RCCB), Miniature Circuit Breaker (MCB), Oscilloscope, Main Switch.
(2) Residual Current Circuit Breaker (RCCB), Miniature Circuit Breaker (MCB), Earth electrode and Earth wire, Main Switch.
(3) Earth electrode, Main switch, Lamp holders and Lamps, Oscilloscope.
(4) Main switch, Miniature Circuit Breaker (MCB), Multimeter, Oscilloscope.
(5) Residual Current Circuit Breaker (RCCB), Main switch, Socket outlets, Transistors.

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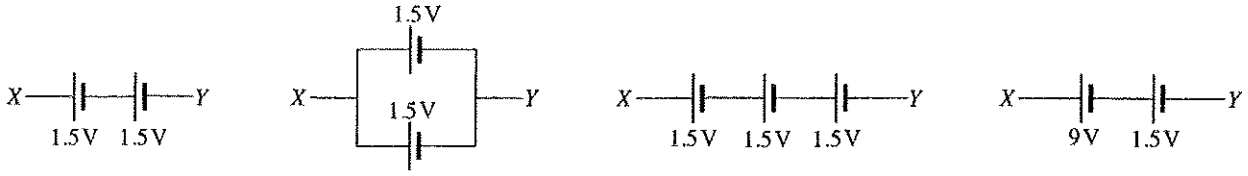
18. Consider the following battery arrangements.



A *B* *C* *D*

Select the answer that gives the total voltage between *XY* of the circuit in ascending order.

(1) *A*, *B*, *C*, *D* (2) *A*, *C*, *D*, *B* (3) *A*, *D*, *C*, *B* (4) *B*, *A*, *C*, *D* (5) *D*, *C*, *B*, *A*

19. Which of the following statements are true about the density of a matter?

A - It depends on the concentration of its atoms. *B* - It does not change with pressure.
C - It changes with its phase. *D* - It changes with temperature.

Which of the above statements are 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) *A*, *B*, *C* and *D* all

20. Which of the following statements correctly explains the centre of gravity of an object?

A - Centre of gravity of an object always lies within the object.
B - Stability of an object increases when centre of gravity goes down.
C - Centre of gravity of an object in neutral equilibrium does not change.
D - Centre of gravity of an object can be determined by hanging the object from its different locations.

(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) *A*, *B*, *C* and *D* all

21. Select the situation/s in which friction force becomes useful?

A - Applying brake in a moving vehicle.
B - Climbing a tree.
C - Skating on snow.

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

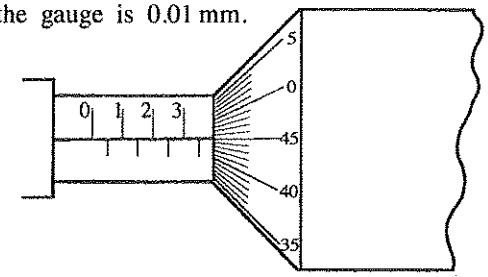
22. What are the correct statements about energy?

A - Energy can be stored in an object in the form of potential, kinetic or strain energy.
B - Potential energy is used in hydro power generation.
C - Kinetic energy is used in wind power generation.
D - Strain energy is used in leaf springs of vehicles.

(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) *A*, *B*, *C* and *D* all

23. Figure shows the measurement of a work piece measured from a micrometer screw gauge. The micrometer screw gauge has **no** zero error. The least count of the gauge is 0.01 mm. Indicated reading is

(1) 3.45 mm.
(2) 3.40 mm.
(3) 3.30 mm.
(4) 3.95 mm.
(5) 4.00 mm.



24. You are standing in a bus which is moving at a certain speed. What is the force acting on your body, only when the bus is passing a bend?

(1) Centrifugal force (2) Centripetal force (3) Impact force
(4) Friction force (5) Gravitational force

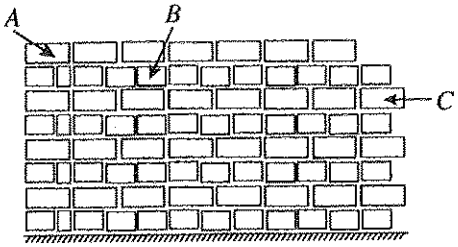
25. An entrepreneur should

(1) always accept challenges.
(2) have minimum understanding of relevant market.
(3) make less attention to manage resources and time.
(4) not study about the business competitors.
(5) take minimum risk.

[*See page five*

26. Standard dimensions of an engineering brick in millimetres are
(1) 215×105.5×65 (2) 205×105.5×65 (3) 215×102.5×60
(4) 215×102×65.5 (5) 215×102.5×65

27. What are the technical terms for *A*, *B* and *C* respectively in the following figure of brick wall construction?

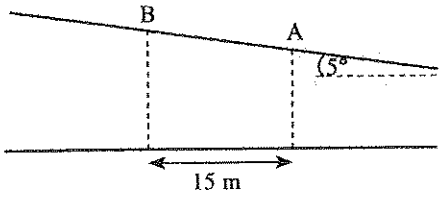


(1) header course, queen header, stretcher course
(2) header course, stretcher course, toothing
(3) stretcher course, header course, toothing
(4) header course, queen header, toothing
(5) stretcher course, header course, queen header

28. Which of the following statements represent good quality bricks?
A - When two bricks collide, a metallic sound should emit.
B - After keeping the brick in a water bath for 24 hours its water absorption percentage should not exceed more than 25% of its weight.
C - When a brick is dropped with its head downward from 1.2m height, it should not break.
(1) *A* and *B* only. (2) *A* and *C* only. (3) *B* and *C* only.
(4) *A*, *B* and *C* all. (5) None of the above.

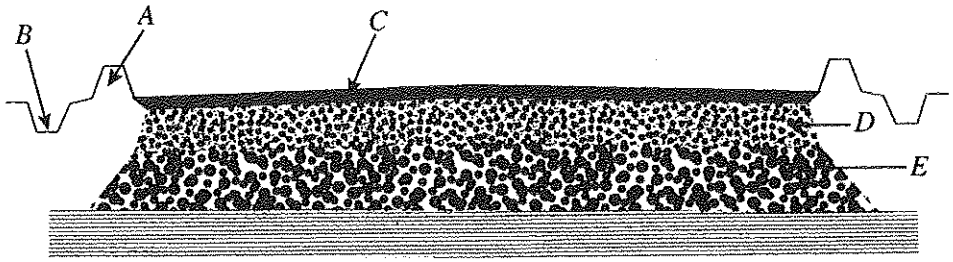
29. Which of the following statements correctly explain the properties of concrete?
A - Concrete can sustain compressive forces effectively.
B - Concrete is weak against tensile forces.
C - Steel reinforcement is used for increasing its tensile capacity.
D - Concrete strength is reduced with increased water to cement (W/C) ratio.
(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) *A*, *B*, *C* and *D* all.

30. In a road survey, levels of cross sections of a road centre line should be taken at 15 m intervals. The gradient of the centre line is 5° upwards. The staff reading at point A is 2.54 m. What is the possible staff reading at point B?



(1) 1.54 m. (2) 1.23 m.
(3) 1.34 m. (4) 1.32 m.
(5) 3.58 m.

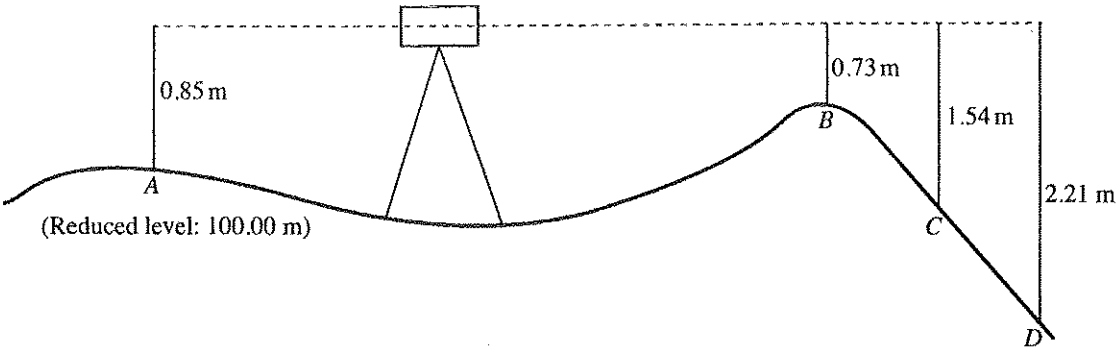
31. A typical road cross section is shown in the following figure.



The shoulder is identified by
(1) A. (2) B. (3) C. (4) D. (5) E

32. Which of the following government organizations is **not** responsible for road maintenance?
(1) Road Development Authority
(2) Provincial Road Development Authority
(3) Urban Development Authority
(4) Municipal Council
(5) Urban Council

33. Find the reduced levels at points B, C and D respectively in meters.



(1) 100.15, 99.31 and 98.64 (2) 100.12, 99.31 and 98.60 (3) 100.12, 99.31 and 98.64
(4) 100.12, 97.31 and 98.64 (5) 100.12, 99.31, 99.64

34. Which of the following are the reasons for removing top soil in building construction?
A - Bearing capacity of top soil is very low
B - Thickness of top soil layer is small
C - Moisture content in top soil is high
D - Top soil contains organic material
(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) *A*, *B*, *C* and *D* all.

35. For which of the following situations, an optical theodolite can be used?
A - measuring horizontal angles
B - measuring vertical angles
C - measuring reduced levels
D - measuring horizontal distance
(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) *A*, *B*, *C* and *D* all.

36. A fire breakout of a large building is reported to the municipal fire brigade. Fire fighters come to the place and attend to the following activities. Among them, which activity should be given the highest priority?
(1) Use fire brigade vehicles to quickly extinguish the fire
(2) Obtain the service of ambulances with doctors
(3) Try rescuing the humans trapped inside the building
(4) Remove valuable things from the building
(5) Avoid fire spreading to surrounding buildings

37. Who is responsible for daily inspection of site safety?
(1) Site engineer (2) Store keeper (3) Work supervisor
(4) Safety officer (5) Chief security officer

38. Banks of an excavated foundation trench might fail due to the reasons given below.
A - Drain water into trenches
B - Storing building materials like rubble near banks of the trenches
C - Walk near banks of trenches
D - Taking wheelbarrows near banks of trenches
Which of the following could happen due to carelessness of labourers?
(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) *A*, *B*, *C* and *D* all.

39. When preparing cement masonary, required amount of water should be added with cement. This is defined as water to cement (W/C) ratio and this can affect the strength of masonary. The minimum W/C ratio can be,
(1) 0.2 (2) 0.3 (3) 0.4 (4) 0.5 (5) 0.6

40. At the end of the day, a portion of cement masonary is left. What should be done with this?
(1) mix with sand and use it on next day
(2) use it for some other work on the same day
(3) cover it not to contact with atmosphere
(4) on the next day mix with cement and use it
(5) mix more water and use it on next day

[*See page seven*

41. Consider the following statements about a white colour kilometre post.
A - cross section is triangular
B - black and yellow colours exist on it
C - class of the road is not mentioned on it
D - 'km' is mentioned on it
Which of the above statements are correct with regard to this item?
(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) *A*, *B*, *C* and *D* all.

42. What is the reason to put bollard on one side or an either side of a road?
(1) To mark the height of retaining wall
(2) To mark the limit of drive lane
(3) To show 'No parking'
(4) To stop the vehicle and rest
(5) To warn about a dangerous slope

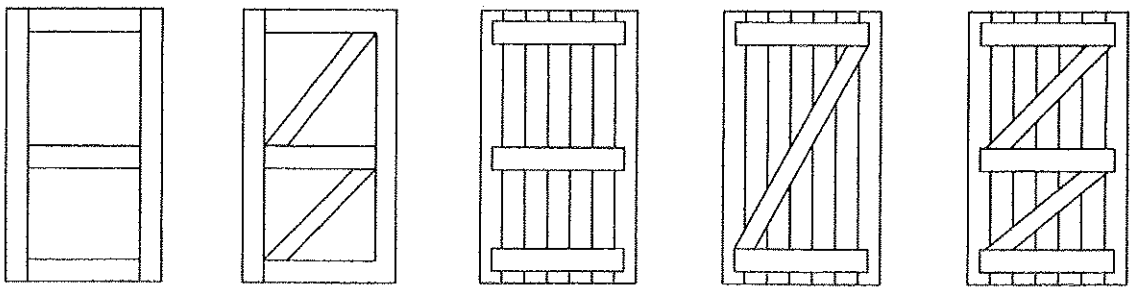
43. Finishing of a roof means
(1) painting the roof surface.
(2) fixing the ceiling to the roof.
(3) constructing the roof in different styles.
(4) putting heat insulation sheets on the roof to prevent heat entering through the roof.
(5) fixing the valance board and drain pipe at the edge of the roof.

44. Which of the following can be noticed in the water of deep tube wells compared to normal tube wells?
A - Water contains clay sediments
B - Water may contain Calcium, Magnesium minerals
C - Amount of Fluoride, Iron is high
D - Water is colourless
(1) *A* and *B* only. (2) *A* and *C* only. (3) *A* and *D* only.
(4) *B* and *C* only. (5) *C* and *D* only.

45. Which of the followings can be advantages of filling water to underground sump and then pumping to a overhead tank without directly pumping to the overhead tank from main line?
A - Can store extra amount of water
B - Water can be supplied even at a case of a pressure drop of main line
C - High pressure water can be supplied for bathrooms
D - Design and maintenance is economical
(1) *A* and *B* only. (2) *A* and *C* only. (3) *A* and *D* only.
(4) *B* and *C* only. (5) *C* and *D* only.

46. Water seal of a water trap is used to avoid air with a bad smell going through it. In a normal water trap, height of water seal is 50mm. A water trap used with 100 mm water seal is
(1) a water trap in a commode. (2) an interceptor. (3) a bottle water trap.
(4) a gully trap. (5) an 'S' type water trap.

47. Various types of timber doors are used in buildings. Among the following figures what is the ledged, braced and battened door?



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

[See page eight

48. Which of the following can affect the length of offsets in chain surveying?
A - Scale of the drawing
B - Method of taking measurement
C - Nature of the land
D - Length of the chain line
(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) *A*, *B*, *C* and *D* all.

49. Who is the responsible person for determing required cement amount for a concrete work?
(1) Site engineer (2) The building owner (3) Work superintendent
(4) Quantity surveyor (5) Store keeper

50. In preparing the BOQs which of the following should be followed?
A - All quantities should be taken in meters, square meters or cubic meters.
B - Centre line method should be used wherever possible.
C - Quantities related to walls, plastering work etc. should be mentioned in BOQs together with sizes of doors and windows.
D - quantities related to roof should be taken first.
(1) *A* and *B* only. (2) *A* and *D* only. (3) *B* and *C* only.
(4) *B* and *D* only. (5) *C* and *D* only.

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இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2015 අගෝස්තු
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2015 ஓகஸ்ற்
General Certificate of Education (Adv. Level) Examination, August 2015

සිවිල් තාක්ෂණවේදය குடிசார் தொழினுட்பவியல் **Civil Technology**	**II** **II** **II**	**14 E II**

පැය තුනයි
மூன்று மணித்தியாலம்
Three hours

Index No. : .....

Important :

* *This question paper consists of **10** 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 (07 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 (03 pages)

* *Select minimum of **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	1	
	2	
	3	
C	4	
	5	
	6	
Total		
Percentage		

Final Marks

In Numbers	
In Words	

Code Numbers

Marking Examiner 1	
Marking Examiner 2	
Checked by	
Supervised by	

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PART A – Structured Essay

*Answer **all four** questions on this **paper itself**.*

*(Each question carries **10** marks)*

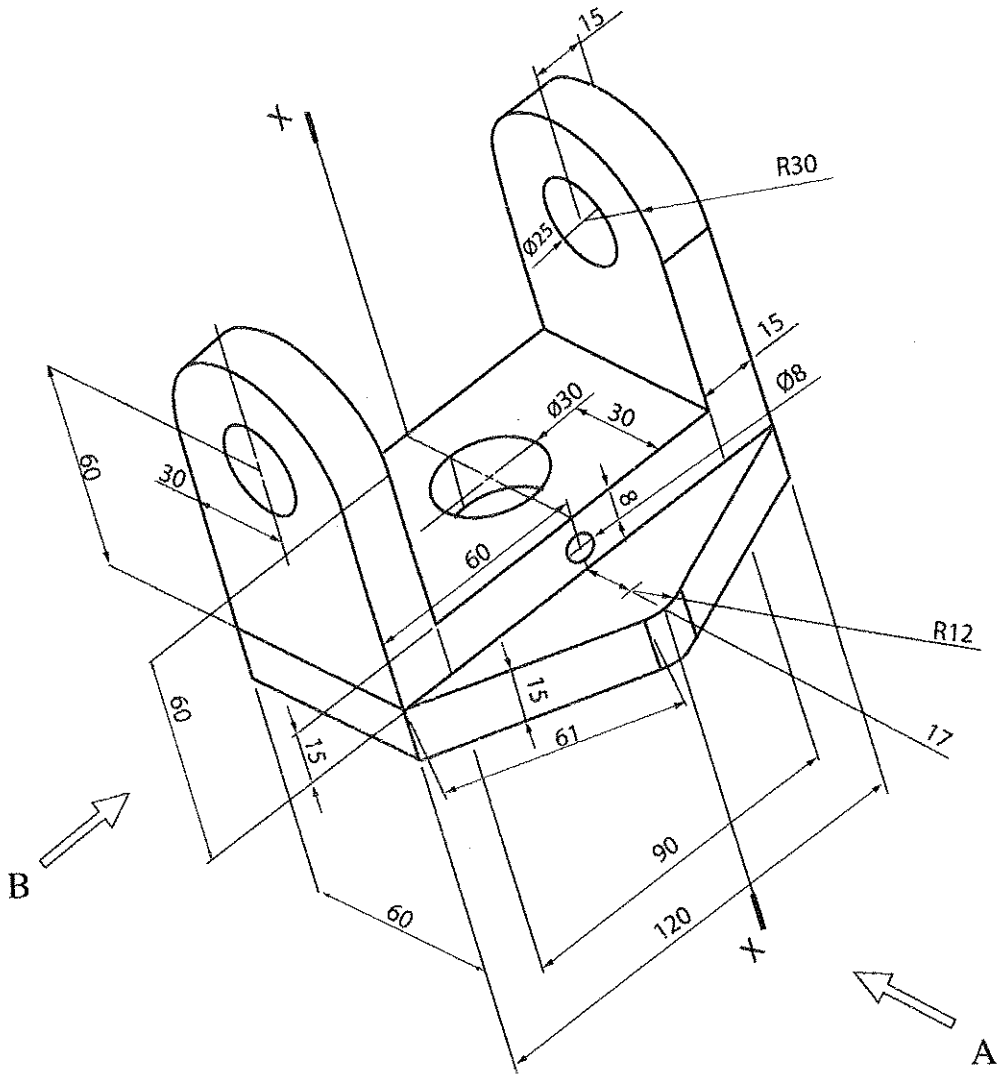
1. An isometric view of a machine component is shown in the figure. The centre hole (ϕ30) passes completely through the component. Machine component is symmetric along the vertical plane passing through **X–X**. Assuming any missing dimensions, draw the following to a suitable scale using first angle projection principle.

   (a) Front elevation seen through direction **A**

   (b) End elevation seen through direction **B**

   (c) Plan

   Show dimensions in the sketches. Use the graph papers given on page 3 and 4 to answer the question. (All dimensions are in mm.)



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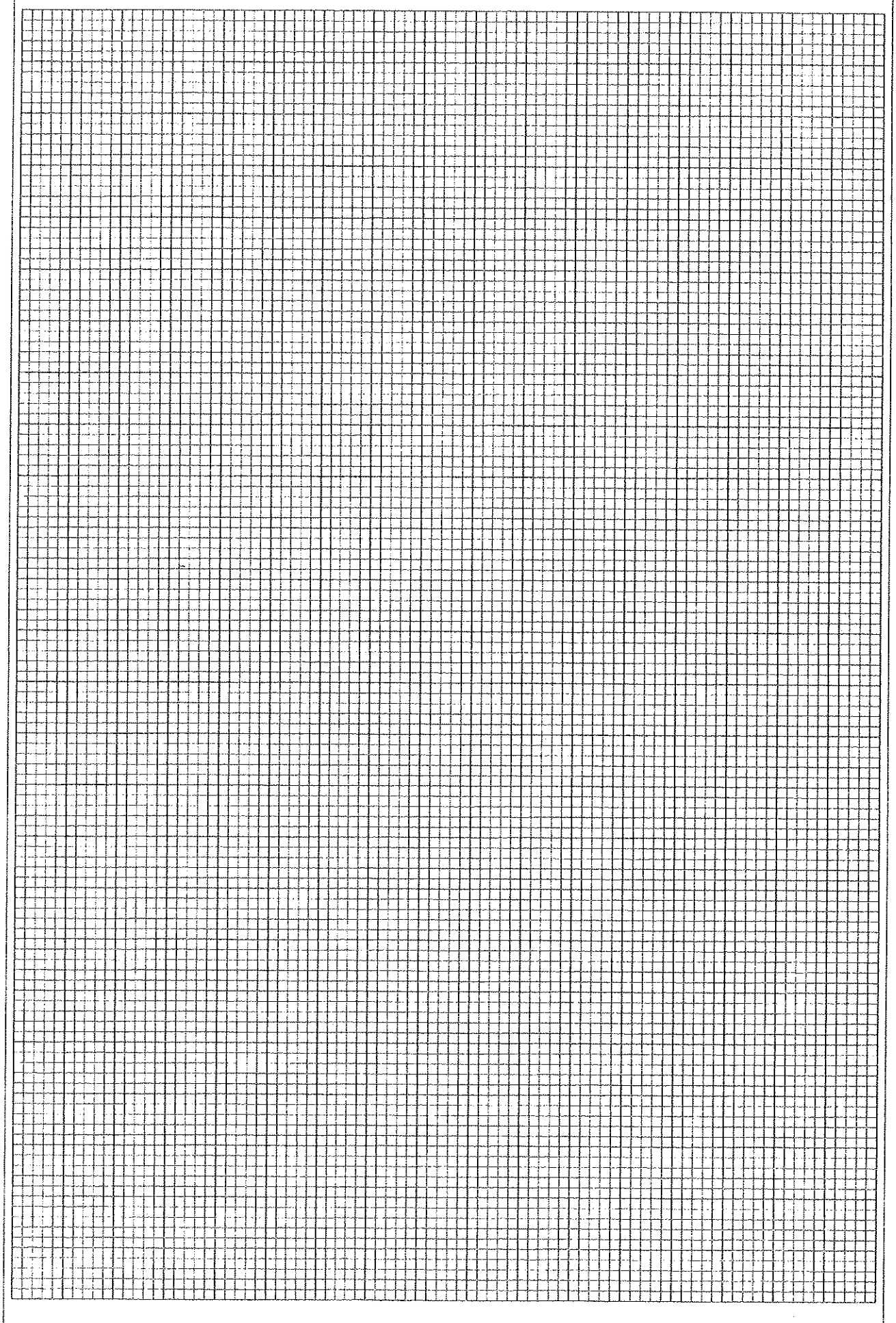

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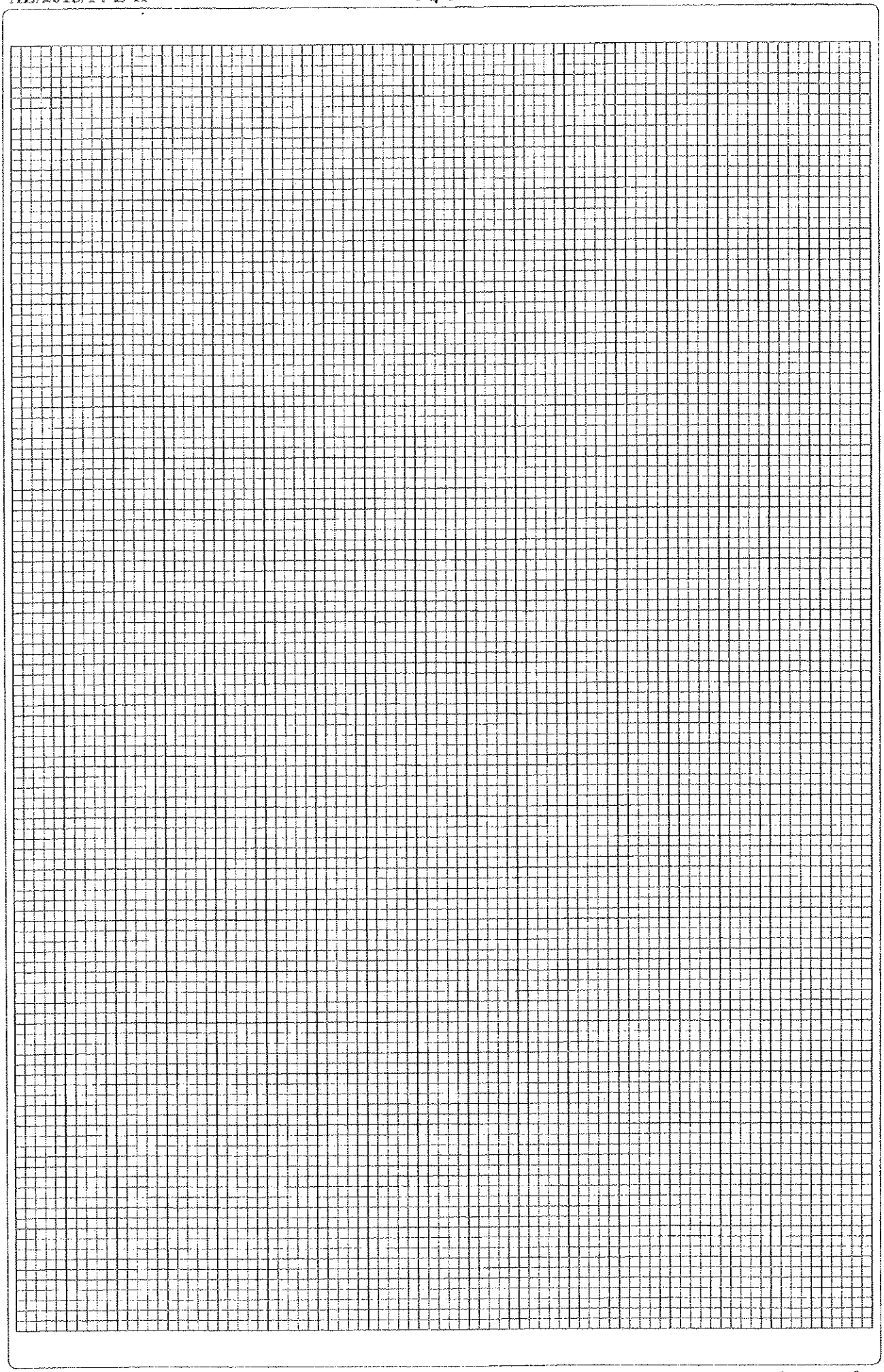

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2. Assume that you are appointed as an IT trainee manager of a hotel. Previously the hotel management has planned to establish a conference room, computer centre and wireless internet facilities in hotel premises. Assume that the previous project proposal is not available now. However, following list of items have already been purchased.

- System units
- Mouse
- Keyboards
- Monitors
- Printers
- Multimedia projector
- Network switches and cables
- Windows operating system
- Microsoft office package

(a) From the purchased items, list hardware and software items seperately.

Hardware : .....

.....

.....

.....

Software : .....

.....

.....

.....

(b) Proposed computer centre will be used for various customer needs, such as preparing documents, presentations, accessing internet and processing photos.

(i) List **three** essential items required to prepare a fully functional computer from available hardware.

1. .....
2. .....
3. .....

(ii) State, from available hardware, a hardware required to create a computer network for the computer centre.

.....

.....

.....

.....

(iii) Identify **two** software requirements for the computer centre in addition to the available ones.

1. .....
2. .....

(c) Proposed conference room will be used for special events, meetings and presentations.

(i) Identify a hardware required for the conference room from the available list.

.....

.....

(ii) Assume that the hotel management decided to have facilities for video conferencing in the conference room. Identify **two** hardware units and a software required for this purpose.

Hardware units

1. .....
2. .....

Software

1. .....

(d) List a hardware item required to purchase to provide the wireless internet facilities.

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3. A typical two storey building is shown in the Figure 3. It is a reinforced concrete framed structure with masonry walls.

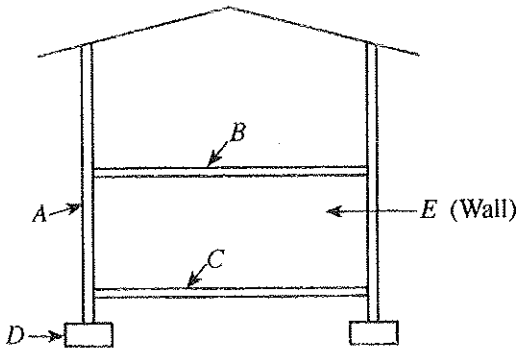

Figure 3

(a) Label the components *A*, *B*, *C* and *D*.

A - .....

B - .....

C - .....

D - .....

(b) Describe **two** factors that affect the type of component '*D*'.

(1) .....

(2) .....

(c) It has been decided to construct English bond for the wall '*E*'. Draw a figure showing different components of English bond.

(d) Engineering bricks are to be used in the construction of walls. Explain **two** methods to check the quality of bricks at the site.

(1) .....

.....

(2) .....

.....

(e) If cement blocks are to be used instead of engineering bricks, state one advantage and one disadvantage of using cement blocks.

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[see page seven

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4. With the development of society, amount of waste materials disposed to the environment is increasing day by day. Therefore the management of waste is of paramount importance to the future well-being of the society.

(a) State the **three** different forms of wastes.

(1) .....

(2) .....

(3) .....

(b) Waste can be categorized on how they are formed and their characteristics. State **two** typical materials each that may include in following waste types.

Domestic : (1) ..... (2) .....

Industrial : (1) ..... (2) .....

Agricultural : (1) ..... (2) .....

(c) State **three** harmful effects of air pollution.

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(d) State **three** different forms of municipal waste management methods with one advantage and one disadvantage of each.

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(e) Explain the difference between bio accumulation and bio degradation waste disposal methods.

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இலங்கைப் பரீட்சைத் திணைக்களம்
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අධ්‍යාපන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2015 අගෝස්තු
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General Certificate of Education (Adv. Level) Examination, August 2015

සිවිල් තාක්ෂණවේදය	II
குடிசார் 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.*
(Give concise answers. Sketch clear figures and label them where necessary.
(Each question carries ***15*** *marks.)*

Part B

1. The famous quote about energy is "Energy cannot be created or destroyed". However, energy can be transformed from one form to another. Different types of machines are used to transform energy into useful forms.
   (a) List **five** natural energy sources and state the basic form of energy stored in each source.
   (b) During energy transformation process, losses are inevitable. Briefly describe **three** reasons for energy losses during transformation process.
   (c) Efficiency of the energy transformation process depends on amount of losses in the process. High efficiencies can be guaranteed by reducing the amount of losses. State, how you minimize the energy losses in following processes.
      (i) Power generation at hydro-power plant
      (ii) Use of refrigerator at home
      (iii) Use of electric iron at home
   (d) Demand for energy is continuously increasing in the present society. However, some energy sources are scarce. Therefore, in the present context, different techniques have been implemented to popularize efficient use of energy. The energy club at your school has planned to organise a programme to make the community aware about the efficient use of energy.
      (i) Briefly explain **two** techniques that can be implemented to popularize efficient use of energy.
      (ii) Explain **two** facts you will discuss in the programme about the efficient use of energy in the following areas.
         1. Transportation
         2. Infrastructure development in public areas

2. Technology is very important in the present context in order to improve the quality of human life. Therefore, the influence of technology developments are widespread across the country. Three important areas; civil technology, mechanical technology and electrical, electronics and information technology are identified as some of the key technological areas for today's need. As a student who is following technology stream in advanced level, you have a social responsibility of making the community aware about the technological development in above areas.
   (a) State **three** benefits of making the community aware about the technology developments in above three areas.
   (b) Give **two** types of resources which can be used to make your community aware of the benefits of utilizing technology. Briefly explain how the mentioned resources are utilized for the purpose.
   (c) How do you overcome the resistance of community for the use of technology in identified areas?
   (d) Briefly explain **two** methods to get the attention of authorities (government/non-government) in order to popularize the use of technology in your community.

[see page nine

3. In a road development project of a city, it is expected to redesign the existing road and pavement system to smoothen the current traffic flow and to ensure the safety of pedestrians.
   (a) It is reported that many accidents happen due to cyclists in this city. Explain **one** suggestion to solve this issue in the road development project.
   (b) Propose **two** methods that can be adopted at junctions in order to ensure the safety of blind people.
   (c) Describe **two** methods to reduce the traffic congestion at the junction in the redesign process.
   (d) It has been found that use of personal vehicles is a major factor contributing to traffic congestion in the city. Propose **three** methods to discourage the use of personal vehicles.

Part C

4. The Figure 4 shows a sewage drainage pipe in a storeyed building.

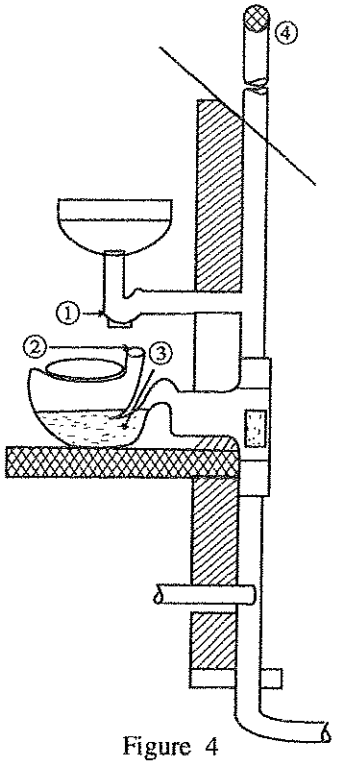

Figure 4

   (a) Identify this sewage drainage system.
   (b) Name ①, ③ and ④ components given here.
   (c) What is the need for this hole ② in the commode?
   (d) What could be the problem if the end at ④ is closed?

5. The Figure 5 shows 6" (150 mm) thick boundary wall made of cement blocks around a land and its cross section.

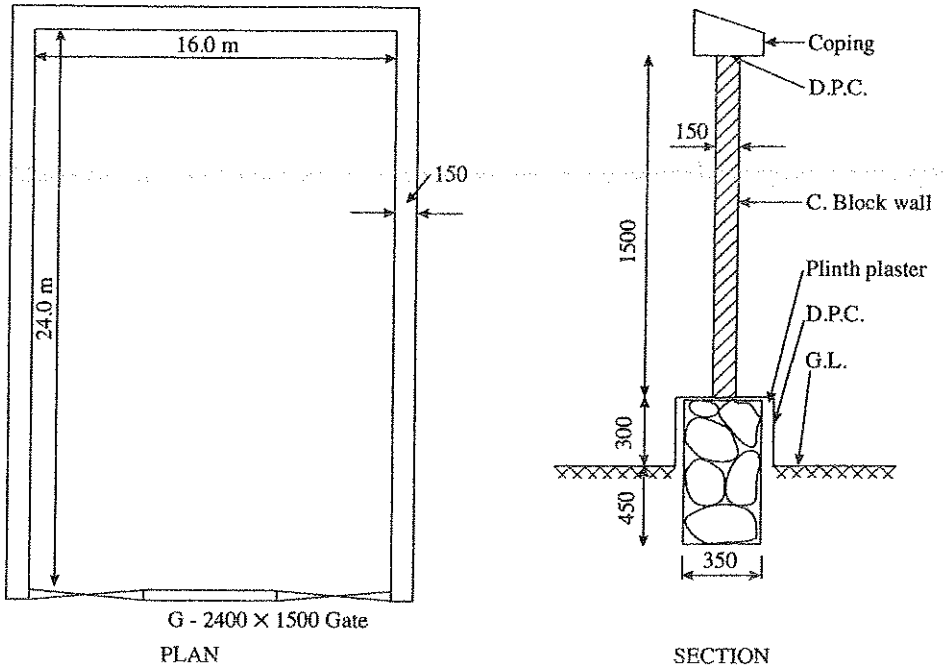

Figure 5

[see page ten

Prepare taking-off sheets for the following.

(a) Excavation for the foundation
(b) Random rubble masonry wall
(c) Damp Proof Course (D.P.C.)
(d) Cement block wall
(e) Plinth plastering

6. A building consists of different components made of different materials. It is important to properly understand forces acting on these components and tensile/compressive strengths of their materials.

(a) Define stress and strain of an engineering material.

(b) Draw a stress-strain diagram of an engineering material and explain following terms with use of the diagram.
(i) Elasticity
(ii) Plasticity
(iii) Malleability / Ductility
(iv) Brittleness

(c) State why Poisson's ratio is an important consideration in engineering materials.

(d) Force-displacement characteristics of an engineering material is shown in the following table. Diameter of the circular test sample is 5 mm and the initial length is 8 mm.

Force (kN)	**Displacement (mm)**
0.0	0.00
10.0	0.10
20.0	0.20
30.0	0.30
40.0	0.40
50.0	0.45
60.0	0.50
65.0	failure

(i) Determine stress and strain of the test specimen.
(ii) Draw the stress-strain curve and determine Young's modulus of the material.

* * *