

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

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අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2018 දෙසැම්බර්
 கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2018 டிசெம்பர்
 General Certificate of Education (Ord. Level) Examination, December 2018

නිර්මාණකරණය හා ඉදිකිරීම් තාක්ෂණවේදය I, II
 வடிவமைப்பும் நிருமாணத் தொழினுட்பவியலும் I, II
 Design and Construction Technology I, II

07.12.2018 / 0830 - 1140

පැය තුනයි
 மூன்று மணித்தியாலம்
 Three hours

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

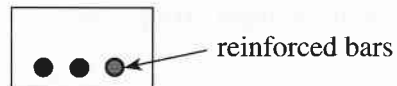
Use **additional reading time** to go through the question paper, select the questions and decide on the questions that you give priority in answering.

Design and Construction Technology I

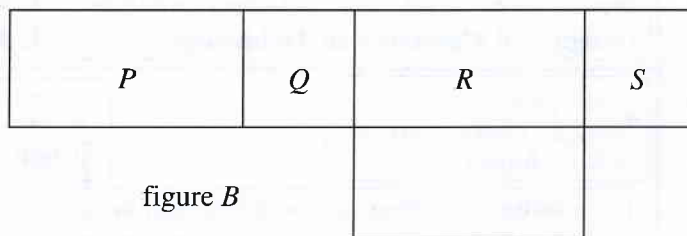
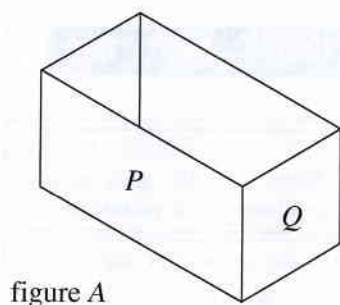
Note :

- Answer **all** questions.
- In each of the questions **1 to 40**, pick one of the alternatives (1), (2), (3), (4) which you consider as **correct or most appropriate**.
- Mark a cross (X) on the number corresponding to your choice in the answer sheet provided.
- Further instructions are given on the back of the answer sheet. Follow them carefully.

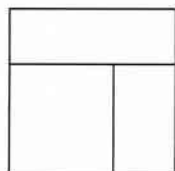
- The bricks are subjected to twist, because
 - they are underburnt.
 - they are overburnt.
 - the clay used is not properly mixed and seasoned.
 - required sand content is not available in the clay used.
- The tools used to hold the timber members firmly, without letting them move on the work bench are known as
 - Bench hook and Vice.
 - Cramp and Bench hook.
 - Cramp and Vice.
 - Vice and Wrench.
- An instance in which the try-square is **not** used is
 - drawing lines at angles of 45° and 90° to its edges in sawing timber.
 - checking the level of timber and whether the timber pieces in planing are right-angled.
 - when assembling timber members checking whether those parts are right-angled.
 - checking the measurements in timber members.
- What is meant by the abbreviation 'RPM' on an electrically-driven machine?
 - Metres travel per minute
 - Revolutions per minute
 - Rate per minute
 - Recycles per minute
- 'Scarf' joint is a
 - lengthening joint.
 - widening joint.
 - Mitre joint.
 - shouldered butt joint.
- The purpose of reinforcing the bottom part of a lintel as shown in the figure is to resist
 - tensile stress.
 - shear stress.
 - compressive stress.
 - strain.



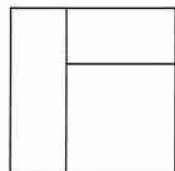
7. The course that is laid placing the 220 mm × 65 mm bottom surface of the bricks that are produced conforming to Sri Lankan standards is known as
- (1) racking back course.
 - (2) toothing course.
 - (3) soldier course.
 - (4) brick on edge course.
8. Development of a box, consisting only a base (figure A) is shown in figure B. When it is drawn to the standard method, what is the defect that can be seen in figure B?



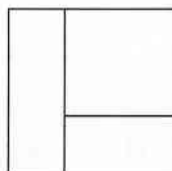
- (1) The lid is not drawn.
 - (2) The folding edges are not shown in broken lines.
 - (3) Quadrilateral indicating base is not drawn under P.
 - (4) Measurements are not equal in parts P, Q, R and S.
9. Select the plan of this solid object, which is drawn in First Angle Projection Method, when viewed from the direction indicated by the arrow.



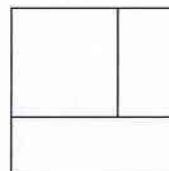
(1)



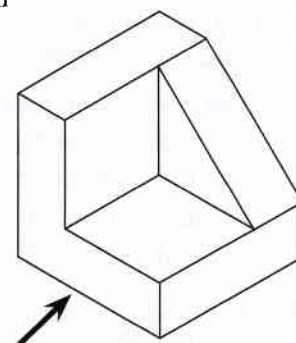
(2)



(3)

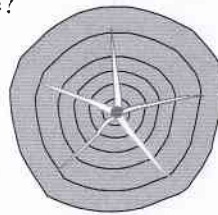


(4)



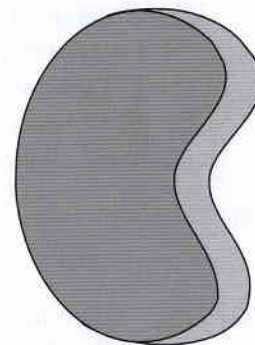
10. When the right side is considered as the front elevation, where is the plan of an object located on a drawing sheet in Third Angle Projection Method?
- (1) Left hand corner, above the side elevation
 - (2) Left hand corner, below the front elevation
 - (3) Right hand corner, above the front elevation
 - (4) Right hand corner, below the front elevation
11. By which name are temporary and occasionally variable loads acting on a structure known?
- (1) Dead loads
 - (2) Live loads
 - (3) Environmental loads
 - (4) Other loads
12. The mixture prepared by mixing sealer and plaster of Paris is a
- (1) preservative application.
 - (2) waterproof application.
 - (3) filling application.
 - (4) rust preventive application.
13. Which of the following is **not** a reason to use 'glass blocks' in finishing walls?
- (1) Ability to make different designs or patterns.
 - (2) Ability to maintain the heat/coolness.
 - (3) Acting as a soundproof.
 - (4) Being comparatively cheap.

14. 'TYPE 600', printed on uPVC pipes means, it can withstand a pressure of
 (1) 600 kPa. (2) 600 N/mm². (3) 600 kN/mm². (4) 600 lbf/in².
15. The pipe accessory used at an end of a pipeline, to close it temporarily so that it can be used at a later occasion is known as
 (1) end cap with screws. (2) end cap without screws.
 (3) elbow. (4) bend.
16. A stop valve is used in a pipe system to
 (1) stop automatically the flowing of water through the pipe system.
 (2) control the quantity of water discharged through the pipe system.
 (3) keep the water column blocked in the suction pipe placed between the motor and water resource.
 (4) fix a tap at the end of the pipe system.
17. The item that should be used to stop the water leak through the PVC screw threads due to the hydro-pressure is
 (1) gunny threads. (2) insulation tapes.
 (3) thread seal tapes. (4) enamel paint sediment.
18. What is the volume of a beam in m³, whose length is 4000 mm, breadth is 200 mm and height is 150 mm?
 (1) 0.012 (2) 0.12 (3) 1.2 (4) 12.0
19. The cost of transportation of materials to the worksite, finished materials to the market or supplier and transporting workmen to and from the site is known as
 (1) labour cost. (2) overhead cost.
 (3) transport cost. (4) raw material cost.
20. When laying a water supply pipeline with PVC, there are occasions where the pipes are to be bent to the required shapes. Select the suitable method to get the bending done, with no harm to the diameter of the pipe and the thickness of the pipe walls.
 (1) Fill water into the pipe, cork both ends, heat the required place and bend.
 (2) Fill coarse sand into the pipe, cork both ends, heat the required place and bend.
 (3) Fill fine sand into the pipe, cork both ends, heat the required place and bend.
 (4) Wrap clothes around the required place, pour hot water on it and bend.
21. The ability to liquidize a material by supplying heat to it is known as
 (1) Plasticity. (2) Brittleness. (3) Fusibility. (4) Elasticity.
22. The timber acquired through conversion of logs is called
 (1) artificial timber. (2) natural timber.
 (3) wrot timber. (4) produced timber.
23. What is the defect of the timber shown in this figure?
 (1) Ring shake.
 (2) Cup shake.
 (3) Star shake.
 (4) Heart shake.

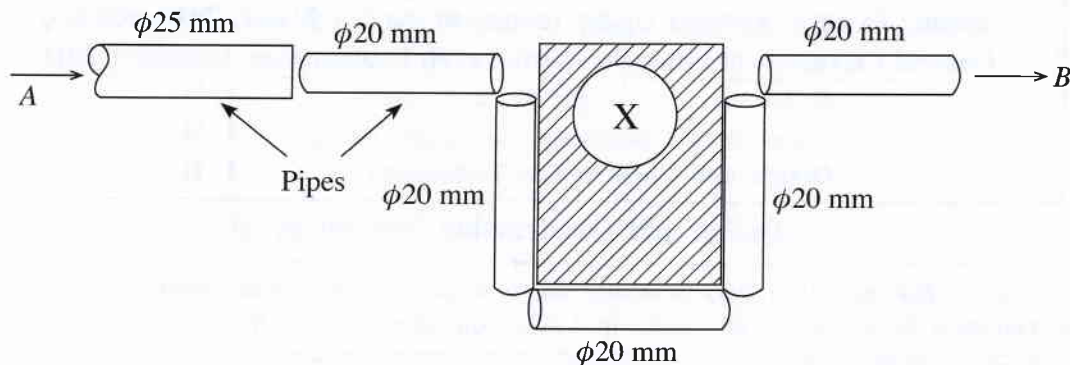


24. For which of the following constructions is the 1:1:2 (20) standard concrete mixture used?
 (1) High strength columns of high rise buildings and pre-cast concrete beams
 (2) Floor paving slabs and foundations
 (3) Water storage tanks and column bases
 (4) Reinforced concrete columns, beams and lintels

25. What is the type of vibrator **not** used in mechanically compacting of concrete?
 (1) Poker vibrator (2) Surface vibrator
 (3) Form vibrator (4) Plate vibrator
26. For which of the following activities are the staples without a head manufactured in mild steel, galvanized and that are pointed at both ends **not** used?
 (1) To connect the timber members at right angles
 (2) To fix the fibres to brushes
 (3) For fencing barbed wires
 (4) To make packing boxes
27. The type of pasting agent used to paste timber members, which is made by mixing protein of milk with slaked lime and caustic soda is known as
 (1) animal glue. (2) synthetic glue.
 (3) casein glue. (4) chemical glue.
28. The magnitude of the angle between the tangent drawn to a circle of centre O at a point P on the circle and the radius OP is
 (1) 30° (2) 45° (3) 60° (4) 90°
29. The curved edge of the face obtained by intersecting a cone parallel to its sloping height is
 (1) a hyperbola. (2) a parabola.
 (3) an ellipse. (4) a circle.
30. The outer frames of the internal partitions, doors, display cupboards and bath room chambers etc. which are manufactured by using Aluminum extrusions are assembled with
 (1) screw nails. (2) L brackets.
 (3) riveting nails. (4) welding.
31. 'Fine continuous irregular line' is a standard type of line used to represent,
 (1) visible edges of an object. (2) hidden edges.
 (3) limiting surfaces. (4) cutting planes.
32. Which set of tools is suitable to make the edges and shapes more accurate in a timber plank sawn as illustrated in the figure?
 (1) Spokeshave and Trying plane
 (2) Spokeshave and Rebate plane
 (3) Rasp and Spokeshave
 (4) Rasp and Rebate plane
33. The properties that could be found in each of the materials, steel bars, bricks and clay mortar that are used for construction activities are respectively,
 (1) Tension, Brittleness and Plasticity. (2) Tension, Compression and Deformation.
 (3) Fusibility, Plasticity and Tension. (4) Elasticity, Brittleness and Plasticity.
34. How many floor tiles of $300\text{ mm} \times 300\text{ mm}$ are required for paving the floor of a room whose internal length and width are 4.5 m and 3.0 m respectively?
 (1) 100 (2) 150 (3) 300 (4) 450



35. A pipe line has to be laid from A to B, where the water should flow smoothly without water hammer, passing the obstruction X as shown in the diagram. To lay the pipe system from A to B, what are the pipe accessories necessary in addition to the water pipes mentioned in the figure?



- (1) One reducing socket, two Elbows.
 - (2) One reducing socket, four Bends.
 - (3) One reducing socket, four Joining sockets.
 - (4) One joining socket, four Bends.
36. To construct a triangle when the lengths of three line segments are given, the total length of two shorter line segments should be
- (1) greater than the length of the longest segment.
 - (2) less than the length of the longest segment.
 - (3) equal to the length of the longest segment.
 - (4) double the length of the longest segment.
37. The total value of the magnitudes of the interior angles in closed geometrical figures of hexagon, pentagon, quadrilateral and triangle are respectively,
- (1) 360° , 720° , 540° , 480° .
 - (2) 720° , 540° , 360° , 180° .
 - (3) 540° , 720° , 180° , 360° .
 - (4) 360° , 540° , 720° , 180° .
38. Consider the following statements:
- A – When sawing with a handsaw, the handle should be held to 3:1:1 method with fingers.
 - B – When an article (product) is made with Aluminum bars, tinwork rivets are used to connect them with each other.
 - C – Mallet is the most suitable tool to tap the head when working with the chisel.
- The **wrong** statement/s out of the above is/are
- (1) only A.
 - (2) only B.
 - (3) only C.
 - (4) All A, B and C.
39. What are the correct names of certificates awarded by Tertiary and Vocational Education Commission (TVEC) for NVQ (National Vocational Qualification) Level 1-4 and NVQ Level 5-6?

	Levels 1 to 4	Levels 5 & 6
(1)	National Certificate	National Diploma Certificate
(2)	National Diploma Certificate	National Certificate
(3)	National Certificate	Degree Certificate
(4)	National Diploma Certificate	Degree Certificate

40. First angle method and Third angle method are used in drawing
- (1) isometric views.
 - (2) parallel (cross) views.
 - (3) perspective views.
 - (4) orthographic views.

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නිර්මාණකරණය හා ඉදිකිරීම් තාක්ෂණවේදය I, II

வடிவமைப்பும் நிருமாணத் தொழினுட்பவியலும் I, II

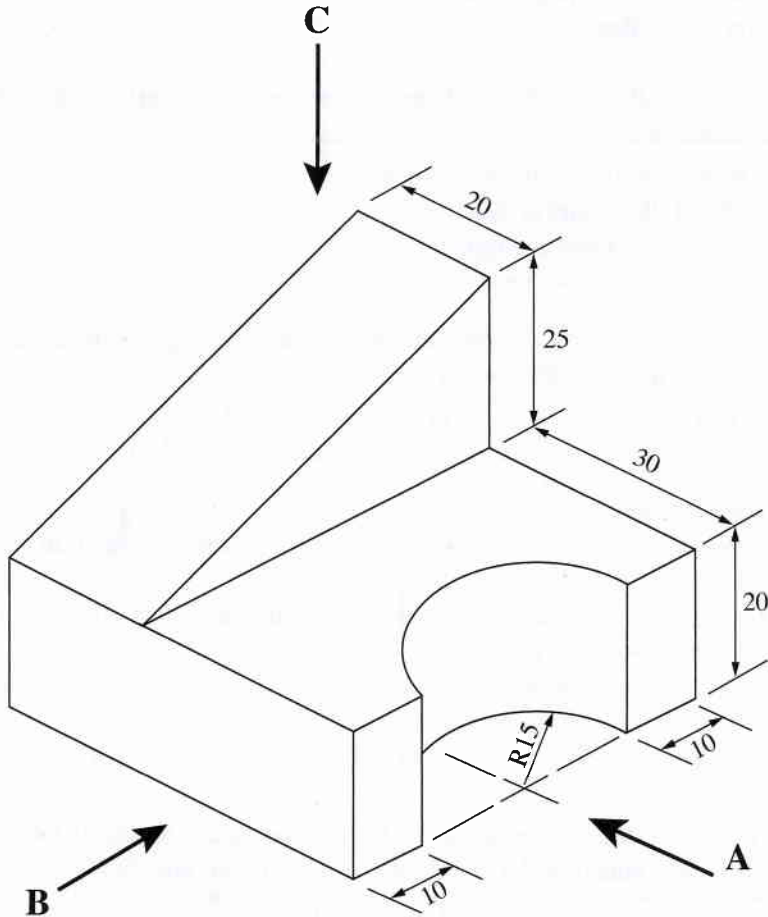
Design and Construction Technology I, II

Design and Construction Technology II

* Answer *five* questions only selecting the *first* question and *four* others.

* Question No.1 carries 20 marks and other questions carry 10 marks each.

1. (i) An isometric view of an object is shown in the diagram below.



(All dimensions are in millimetres.)

As per the above isometric figure, draw the views given below in Third Angle method following the principles of Orthographic projection.

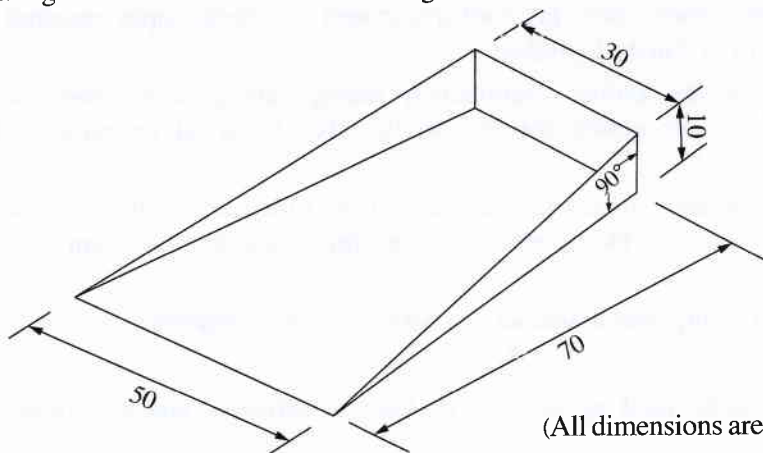
Front elevation, from arrow A

Side elevation, from arrow B

Plan, from arrow C

Used scale should be 1:1.

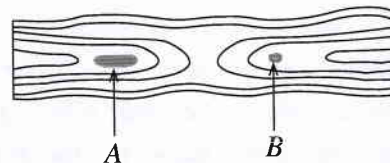
- (ii) The 'plate portion' of a dust pan, bent out of thin sheets, which should be completed by fixing a handle is shown in the figure.



(All dimensions are in millimetres.)

Construct the development, that should be drawn on the thin sheet to bend this portion. (It is not necessary to draw additional parts to indicate joints.)

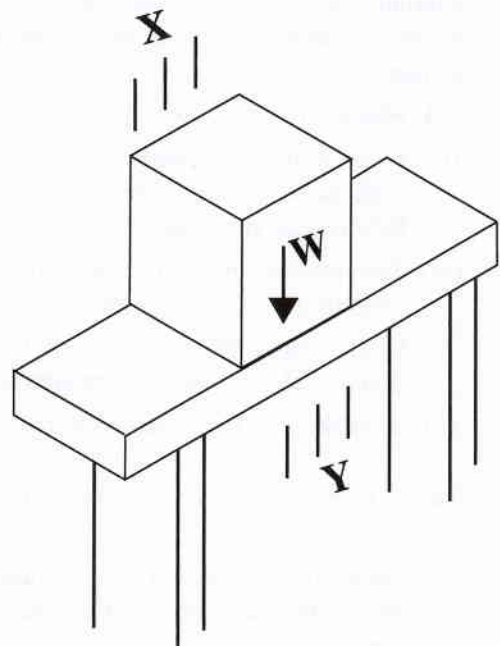
2. The government has given its consent to construct houses for several villagers, who lost their houses due to a landslide. According to the approved house plans, thickness of external and internal walls of the houses are 1 brick and a $\frac{1}{2}$ brick, respectively. All external walls should be strong enough to bear loads and it has been suggested that all walls should be plastered and painted.
 - (i) Name in order, **two** types of brick walls that you suggest for external and internal walls.
 - (ii) Draw a front elevation of the suggested external wall for a length of 6 bricks, and 5 courses high, with stopped end at one edge while the other is toothed. Briefly describe, the special features of the external wall drawn by you.
 - (iii) The mason instructs the helpers that soaking the bricks in water is compulsory, before construction of the wall. State the reasons for soaking bricks.
 - (iv) Construction of walls has to be done systematically and methodically. State the hand tools that should be used to maintain the horizontality and verticality of a wall.
 - (v) State **two** defects that could be seen in bricks and explain them briefly.
3. There is an excessive demand for the timber which are suitable to be used in construction industry.
 - (i) Name **four** stages of using timber from foundation stage to completion stage (except finishing work) in the process of constructing a residence, and write a type of timber appropriate for each stage.
 - (ii) Two special situations named A and B as illustrated, were found on a timber plank obtained by sawing (converted) a timber log.



State causes separately for these **two** situations occurred during the growth of trees.

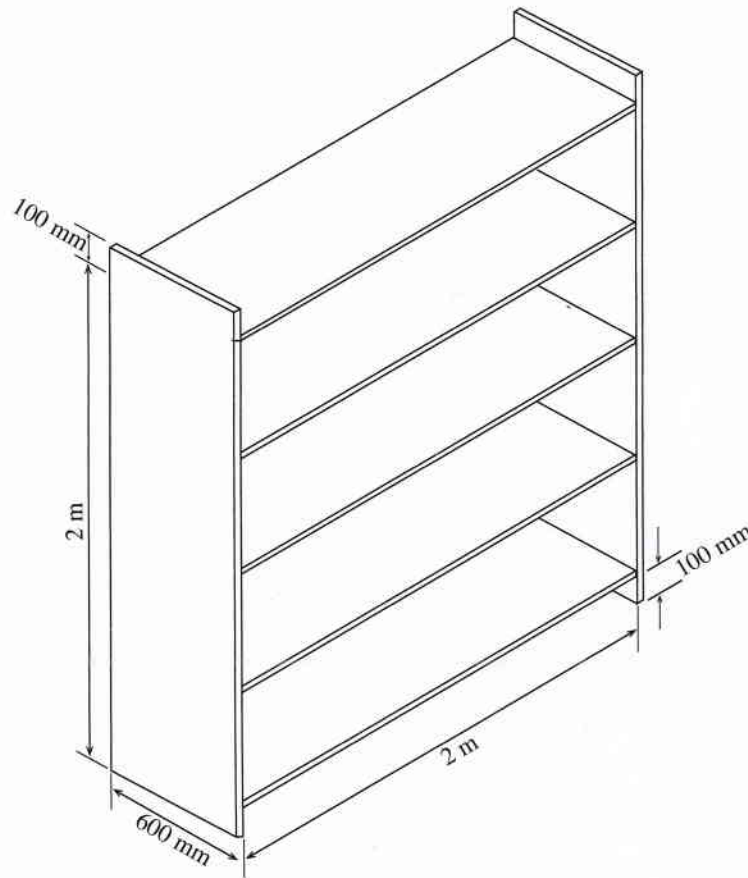
- (iii) State **two** special features that can be found in well grown trees in wet and dry weather zones.
- (iv) Manufactured timber and prepared Aluminium extrusion profiles are used in construction activities. Write one **disadvantage** of each of the above materials.

4. Tools and equipment have to be used in addition to required material for any production activity.
- State three examples that show, how the tools/equipment not being upto required standard affect the productivity of a finished product.
 - The handsaw jams inside the timber continuously during sawing if the hand saw is not properly sharpened. Name the action that has to be taken to avoid jamming and explain briefly how it is done.
 - The weaknesses in maintenance affects the decrease of the efficiency of the hand operated or power operated machines during the operations. Write **three** activities that can be performed in maintaining machines.
 - What is the purpose of using metal washers in fixing timber members?
5. Concrete mixtures are commonly used in various construction activities and is important to use proper ratios in mixing.
- State the materials used in Sri Lanka as binding material, fine aggregates and coarse aggregates in concrete.
 - After removing the formwork of a concrete, it was found that the surface of the concrete had holes and voids as honeycombs and further, it was found that metal and sand particles could be separated easily. State the reasons for this situations.
 - Write the purpose of the 'slump test' that is done for mixed concrete.
 - Figure shows a horizontal concrete beam placed on two vertical columns. By drawing arrow heads on the lines, X and Y, show the compressive and tensile forces affecting this beam.
(X and Y lines should be drawn on answer script.)



6. Water is required for all organisms in different quantities.
- Name the **two** methods of obtaining water for domestic premises.
 - Name **four** types of pipes, manufactured in different materials which are used to carry water.
 - State the differences between uPVC and CPVC pipes.
 - A request has been made by the Principal to provide two water connections with water taps, from the service line runs to the School Agriculture farm to the front and the end of newly arranged flower beds near the office.
- Sketch and name the office, flower beds, farm and the service line that runs to the agriculture farm as per your opinion and mark the proposed supply line with two taps.
Prepare a list of materials, tools and equipments required to install the supply line.

7. The figure shows an isometric sketch of a rack, which is to be made to place the creations of students in a primary unit of a school. It is proposed to use 12 mm thick 'Ginisapu' timber.



- (i) Name **two** basic information needed to prepare an estimate for a product.
- (ii) Name **two** elements which are considered, when calculating the production cost of a product excluding institutional cost and profit.
- (iii) According to the figure of the rack, write the number of timber pieces required and their lengths in metres separately and calculate the amount of money required to purchase this quantity. (Assume the cost of 1m of timber is Rs. 450.00)
- (iv) Calculate the total cost for painting all the surfaces of this rack, if the cost per 1 m^2 is Rs. 400.00
