

OL/2018/89-E-I, II

සියලු ම හිමිකම් ඇවිරිණි / முழுப் பதிப்புரிமையுடையது / All Rights Reserved]

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89 E I, II

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 கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2018 டிசெம்பர்
 General Certificate of Education (Ord. Level) Examination, December 2018

නිර්මාණකරණය හා යාන්ත්‍රික තාක්ෂණවේදය I, II
 வடிவமைப்பும் இயந்திரத் தொழினுட்பவியலும் I, II
 Design and Mechanical Technology I, II

07.12.2018 / 0830 - 1140

පැය තුනයි
 மூன்று மணித்தியாலம்
 Three hours

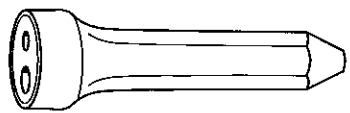
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 மேலதிக வாசிப்பு நேரம் - 10 நிமிடங்கள்
 Additional Reading Time - 10 minutes

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

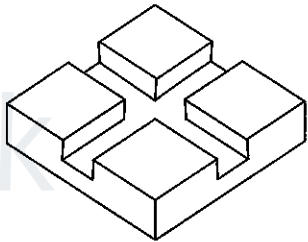
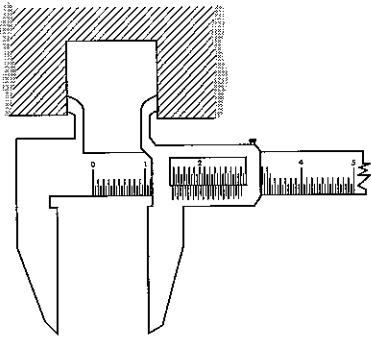
Design and Mechanical Technology I

Note :

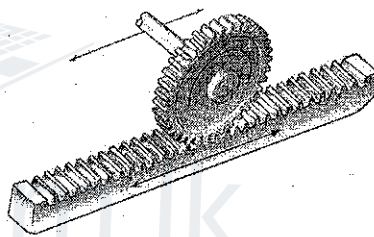
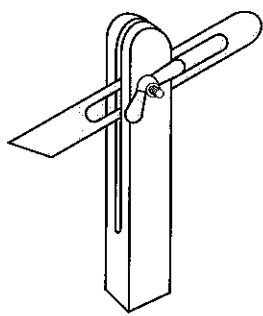
- Answer all questions.
- In each of the questions 1 to 40, pick one of the alternatives (1), (2), (3), (4) which you consider as correct or most appropriate.
- Mark a cross (X) on the number corresponding to your choice in the answer sheet provided.
- Further instructions are given on the back of the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

- The materials fed into the blast-furnace, in manufacturing Pig iron, are fired by
 - burning kerosine oil.
 - hot air.
 - burning diesel.
 - electrical coils.
- The accessory called 'Vice clamps' is used to
 - fix a soft work item on the vice.
 - protect the jaws of the vice in fixing a hard work item.
 - fix a work item on to the bench drilling machine.
 - make use of a vice with worn out jaws of vice.
- The figure shows an equipment used in metal work. What is this equipment?
 - Groover
 - Combined rivet set and snap
 - Half round chisel
 - Round bottom stake
- Metallic items are commonly produced by casting. What is the specific characteristic that a metal used to cast should have?
 - Fusibility
 - Ductility
 - Malleability
 - Brittleness
- To which of the following instruments do the devices jet nozzle, spray nozzle, jet and spray nozzle belong?
 - Fuel injector pump
 - Fuel injector
 - Fire extinguisher
 - Ink spray gun
- What are the personal protective equipment necessary for a technician who is going to repair a complicated electrical circuit in which, the electricity in the system is not disconnected even though the electricity supply to the circuit is disconnected?
 - Rubber gloves, goggles, face shield
 - Electricians' plier, face shield, rubber boots
 - Rubber boots, tools with insulated handles, rubber gloves
 - Fire extinguisher, rubber boots, electricians' plier

[see page two]

7. The Policies adopted by a certain factory to define 'Safety First' are as follows.
- A - Limiting the access of certain areas for outsiders
 B - Use of covers around the moving parts of machines
 C - Maintaining the main electrical switch under lock and key
 D - Maintaining the fire extinguisher up to date
- Out of the A, B, C and D policies above the correct ones are?
- (1) A, B and C only (2) A, B and D only
 (3) A, C and D only (4) B, C and D only
8. The method of 'annealing' in hot treatment of a metal project is heating the metal project to red hot and
- (1) dip in oil at once. (2) dip in water at once.
 (3) hang so as to expose to the wind. (4) close it under ash.
9. What are the metals mixed in manufacturing the metal Bronze?
- (1) Copper and Lead (2) Tin and Zinc
 (3) Copper and Tin (4) Lead and Zinc
10. What are the materials included in an ordinary welding rod which is used for electric arc welding?
- (1) Mild steel and flux (2) Non corrosive steel and flux
 (3) Wrought Iron and flux (4) Pig Iron and flux
11. What are the two gases used in gas welding method?
- (1) Acetylene and Nitrogen (2) Oxygen and Hydrogen
 (3) Nitrogen and L.P. Gas (4) Acetylene and Oxygen
12. Cross shaped rectangular grooves have been engraved on a 10 mm thick metal piece as shown in the diagram. What is the set of tools necessary to perform this work?
- (1) Flat chisel, Centre punch, Hacksaw, Hammer
 (2) Cape chisel (cross cut), Hacksaw, Scriber, Hammer
 (3) Diamond-point chisel, Flat chisel, Centre punch, Hammer
 (4) Half round chisel, Flat chisel, Centre punch, Hammer
- 
13.  The figure shows taking a measurement using a measuring equipment. The measurement is
- (1) the thickness of a work piece.
 (2) the depth of a hole.
 (3) the diameter of a pipe.
 (4) an internal measurement.
14. Select the choice that includes the magnitudes of the angles which could be drawn by only using set squares in the geometrical instrument box.
- (1) 30°, 45°, 105°, 120° (2) 30°, 60°, 115°, 120°
 (3) 30°, 45°, 110°, 135° (4) 30°, 60°, 125°, 160°
15. What is the geometrical shape shown on the cut plane, when a conical shaped solid object is cut along its axis (centre line)?
- (1) Parabola (2) Circle (3) Triangle (4) Ellipse

[see page three]

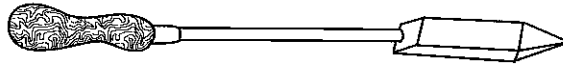
16. 'Centre Lines' are used in Geometrical and Mechanical Drawings to show
- (1) the boundaries of a figure.
 - (2) the boundaries of circular shapes.
 - (3) the cut surfaces.
 - (4) the symmetrical divisions of a figure.
17. Compass, Divider, Set squares and Ruler are the equipment included in a Geometrical Instrument Box. Out of these, the Divider is used to
- (1) draw circles.
 - (2) mark centres of circles.
 - (3) mark a length measurement on several times.
 - (4) copy down the angles.
18. The first activity, that should be done in construction of a 'common transverse tangent', to two circles of which diameters are equal and centres *A* and *B*, is
- (1) measuring the distance between the centres of the circles.
 - (2) bisecting the distance between *A* and *B*.
 - (3) drawing two diameters of two circles.
 - (4) connecting the centres of two circles.
19. What is the appropriate method of drawing an ellipse, to mark an elliptical flower bed in the compound just in front of a residence?
- (1) Mechanical method
 - (2) Trammel method
 - (3) Concentric circle method
 - (4) Arc intersecting method
20. What is the accessory shown in the figure?
- (1) Rack and Pinion
 - (2) Worm and worm wheel
 - (3) Bevel gear wheel
 - (4) Helical teeth bevel gear
- 
21. British system and the Metric system are the two measurement systems used frequently. What is the measurement in Metric system equivalent to 1 inch in British system?
- (1) 24.4 millimeters
 - (2) 25.4 millimeters
 - (3) 26.4 millimeters
 - (4) 28.4 millimeters
22. In Galvanizing, what is the metal used for coating?
- (1) Aluminum
 - (2) Zinc
 - (3) Lead
 - (4) Tin
23. A common feature shown in basic non-ferrous metals is
- (1) lightness.
 - (2) non-corrosiveness.
 - (3) plasticity.
 - (4) low melting point.
24. What is the equipment shown in figure, which could be used in many technological fields?
- (1) Try square
 - (2) Bevel gauge
 - (3) Vernier caliper
 - (4) Jenny caliper
- 
25. There are many types of fire. Out of them, what is the class, which includes "Metal fire"?
- (1) A
 - (2) B
 - (3) C
 - (4) D

[see page four]

26. What is the thickness of a sheet in millimeters, equivalent to SWG 10 when measured by Standard Wire Gauge?
 (1) 0.35 (2) 3.25 (3) 8.23 (4) 10
27. What is the equipment used to measure the space between the electrodes of spark plug in motor ignition system of vehicles?
 (1) Vernier caliper (2) Inside caliper
 (3) Micrometer (4) Gap-gauge (Feeler gauge)
28. It is observed that more carbon stacks frequently at the end of spark plug electrodes of a four stroke motor cycle engine. Which of the following could be the reason for this?
 (1) Burning lubricant oil due to depreciation of the engine
 (2) Block of the air filter
 (3) Spark plug adjusted incorrectly
 (4) Ignition system with defects
29. 4 AH has been indicated on a battery of a Motor cycle. What does it mean?
 (1) It requires a current of 4A in recharging.
 (2) 4 ml of distilled water is to be used.
 (3) Maximum voltage is 4 V.
 (4) Possibility to obtain a current of 4 A in an hour.
30. Different methods are used in power transmission. It is required to carry on necessary maintenance procedures in order to obtain better performance. What is the method of power transmission which requires minimum maintenance procedures out of the following?
 (1) Chain and sprocket drive system (2) Pulley and belt drive system
 (3) Gear wheel drive system (4) Rod drive system
31. To join metals each other, different welding processes are used. What is the appropriate welding process used to join two thin metal sheets of SWG 30?
 (1) Tig welding (2) Spot welding
 (3) Mig welding (4) Electric-arc welding
32. The hammer commonly used for usual work in a metal work factory is
 (1) cross peine hammer. (2) claw hammer.
 (3) ball peine hammer. (4) straight peine hammer.
33. A situation where a rotary motion is converted into a linear motion is
 (1) drawing water from a well by using a block.
 (2) the motion of a pendulum in a clock.
 (3) the brake system of the motor cycle.
 (4) motion of the jaws on a parallel vice.
34. The respective motions of crank shaft, piston and suction valve when an engine is on, are
 (1) rotary motion, reciprocating motion, reciprocating motion.
 (2) rotary motion, oscillating motion, reciprocating motion.
 (3) rotary motion, reciprocating motion, oscillating motion.
 (4) rotary motion, linear motion, reciprocating motion.
35. In the thermo syphon circulation system, cooled water in the engine is conveyed through the radiator
 (1) by water pump. (2) by convection flows.
 (3) by conduction. (4) by vacuum.

[see page five

36. What is the tool shown in the figure?



- (1) Straight bough (2) Hatchet bough
 (3) Blacksmith's tongs (4) Flux brush
37. Which of the following is the flux used in brass welding?
 (1) Zinc chloride (2) Magnesium Oxide
 (3) Borax (4) Potassium Peroxide
38. What is the most suitable power transmission for heavy vehicle brake systems?
 (1) Vacuum system (2) Hydro-pressure system
 (3) High pressure air system (4) Mechanical system
39. What is expected by increasing the pressure in a water cooling system?
 (1) Increasing the boiling point of water.
 (2) Water circulation in good manner.
 (3) Quick water cooling.
 (4) Decreasing the freezing point of water.
40. What is the maximum NVQ level of the certificates which could be obtained from a College of Technology?
 (1) 6 and 7 (2) 5 and 6 (3) 4 and 5 (4) 3 and 4

* *

agaram.lk

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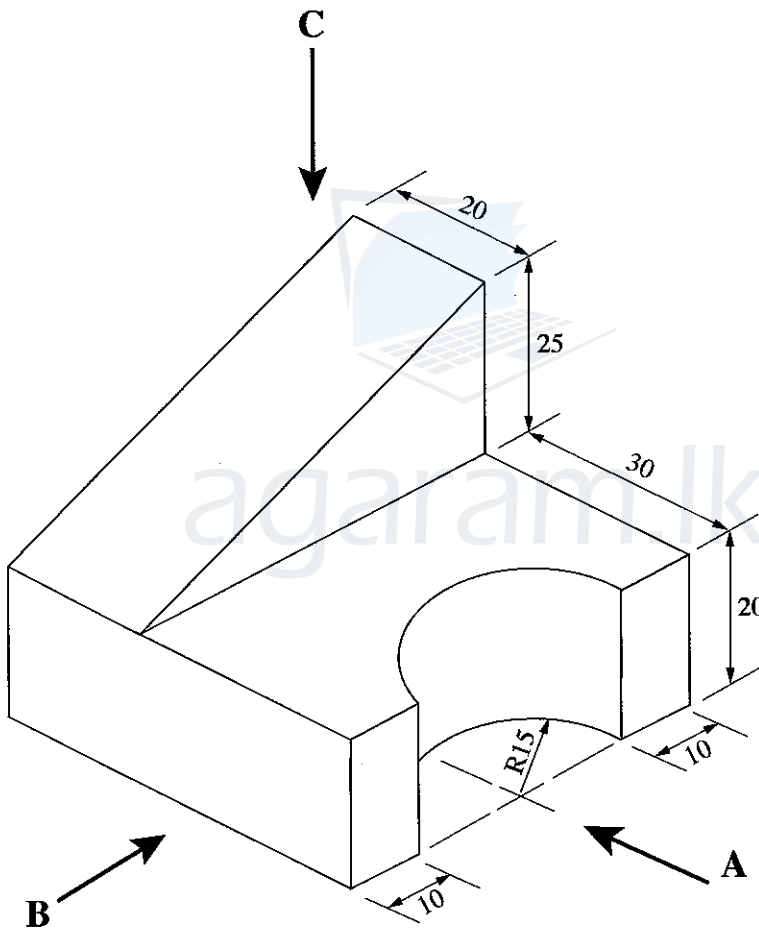
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 வடிவமைப்பும் இயந்திரத் தொழினுட்பவியலும் I, II
 Design and Mechanical Technology I, II

Design and Mechanical Technology II

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

1. (i) An isometric view of an object is shown 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

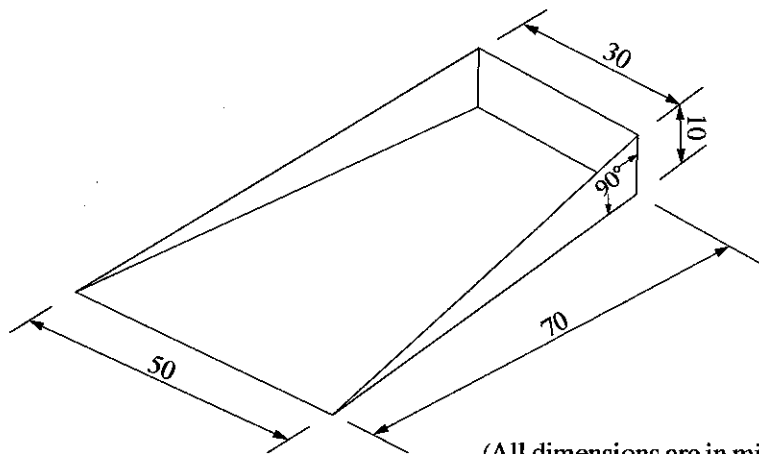
Side elevation, from arrow B

Plan, from arrow C

Scale 1:1 should be used.

[see page seven

- (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.



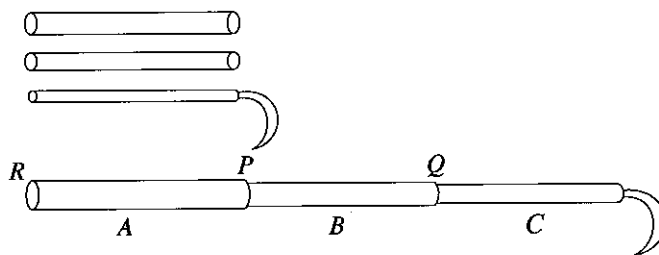
(All dimensions are in millimetres.)

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

2. Different types of tools and equipment are to be used in Metal technological process. By this the activity can be completed accurately and efficiently.
 - (i) Name **four** types of tools and equipment used for measuring and marking.
 - (ii) Name **four** types of chisels.
 - (iii) Draw a diagram of one of the chisels.
 - (iv) State **four** advantages of using a shadow board when storing tools.
3. The metal sheets are necessary for a technician, to manufacture body of vehicles, buckets, basins, wheel barrows, mortar pans etc.
 - (i) State **three** points that should be considered in selecting the required metal sheets according to the job.
 - (ii) State **two** types of soft hammers, used to form metal sheets.
 - (iii) State **three** types of stakes used to form metal sheets.
 - (iv) Draw a diagram of the stake mentioned by you.
4. The lubrication system takes an important place out of all the systems of a motor vehicle.
 - (i) State **two** lubricants.
 - (ii) State **two** functions performed by lubricant oil.
 - (iii) Each type of oil is numbered when manufacturing lubricant oil. State the differences in SAE 40 and SAE 90 which are used in large scale.
 - (iv) State **three** lubricating systems used for Engines.
5. A part of heat, generated by fuel combustion of an internal combustive engine, converts into energy, and the balance of heat increases the temperature of the engine. To control this a cooling system is necessary.
 - (i) State the main systems of cooling engines.
 - (ii) State **two** advantages and disadvantages, each of the cooling systems you mentioned.
 - (iii) Describe briefly the performance of the temperature controlling valve.
 - (iv) Draw a diagram of a radiator cap and state its process briefly.

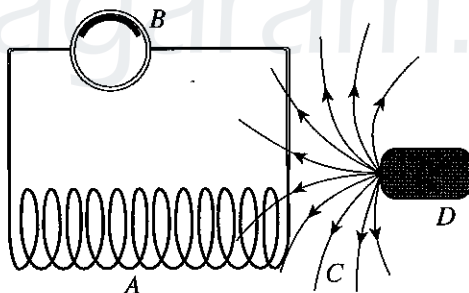
[see page eight

6. The following figure shows the sketch of a drawing of construction presented by a student to make a hook of which length can be adjustable constructed according to the telescopic method. Here, the three pipes have been named as *A*, *B* and *C*.



- * The pipes can be moved up and down and hold its position at *P* and *Q*.
- * When pipes are drawn into each other and constricted, they should not move out from the place *R*.
- * It should be adjusted and locked at *P* and *Q* to the required distances.

- (i) Explain by a diagram, how you would propose to construct this, according to the specifications given above.
 - (ii) Draw a diagram of the structure made as not to move from place *R* after inserting the pipes.
 - (iii) Explain how this equipment is constructed.
 - (iv) Prepare a list of tools and equipment used by you to construct this equipment.
7. The following figure shows a structure that is used to explain the function of a Magneto ignition system.



- (i) Name the parts *A*, *B*, *C* and *D* mentioned here.
- (ii) 'External Electrical source is not necessary for Magneto ignition system.' Explain this statement by giving reasons.
- (iii) Explain the special feature of the electrical wire which travels electricity from ignition coil to the spark plug.
- (iv) Explain the importance of correct adjustments of 'air gap' between the spark plugs.
