

සියලු ම හිමිකම් ඇවිරිණි / முழுப் பதிப்புரிமையுடையது / All Rights Reserved

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අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2022(2023)
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2022(2023)
General Certificate of Education (Ord. Level) Examination, 2022(2023)

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

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.

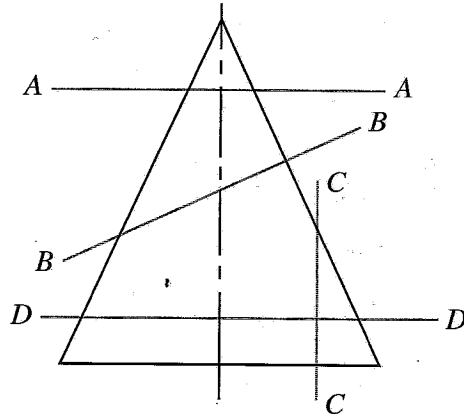
Design and Mechanical Technology I

Instructions:

- * Answer all questions.
- * In each of the questions 1 to 40, pick one of the alternatives (1), (2), (3), (4) which is 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.

- What is the standard line that is used to show hidden edges of a plan drawing?
(1) _____
(2) _____
(3) _____
(4) _____
- The number of tangent/tangents that can be drawn to a circle from an externally established point is/are
(1) 1. (2) 2. (3) 4. (4) 360.
- Select the **wrong** statement out of the following statements.
(1) Value of sum of internal angles of a regular pentagon is equal to the value of the sum of internal angles of three triangles.
(2) There are same length two sides and same value two angles in an isosceles triangle.
(3) If two lines to be perpendicular to each other, the angle in between the two lines must be 90°.
(4) When draw concentric circles with different radiuses, the value of angles around the centre of circles are different from each other.

4.

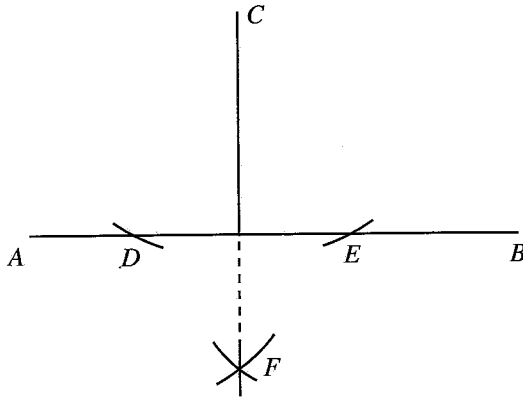


Few sectional planes on a cone are shown as A-A, B-B, C-C and D-D. Which sectional plane shows a shape of an ellipse when cut across?

- (1) A-A (2) B-B (3) C-C (4) D-D

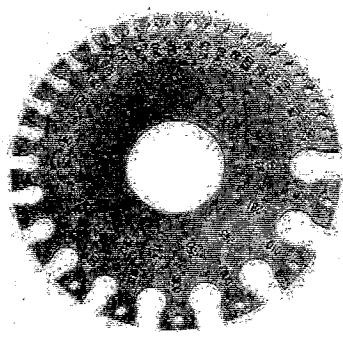
5. The correct geometrical constructions that can be drawn with a specified length or a specified radius by joining two points on a flat surface are
- (1) one straight line and one arc.
 - (2) one straight line and two arcs.
 - (3) two straight lines and one arc.
 - (4) two straight lines and two arcs.

6.



The geometrical construction shown in the above figure, is used

- (1) to draw a perpendicular to a straight line from an external point.
 - (2) to bisect a straight line.
 - (3) to bisect a straight line perpendicularly.
 - (4) to divide a straight line in a ratio.
7. By applying an external force to a metal, the original shape of the metal can be changed without cracks. How this property of metal is known in technology?
- (1) Brittleness (2) Fusibility (3) Malleability (4) Plasticity
8. The first stage of producing ferrous metal is pig iron. What is the furnace used for the production of pig iron?
- (1) Electric furnace (2) Blast furnace (3) Cupola furnace (4) Open hearth furnace
9. What is the metal mostly used to make engine block, outer ring of bearing and machine housings?
- (1) Cast iron (2) Mild steel (3) High carbon steel (4) Bronze
10. While trying to drill a hole on a flat metal surface using a twisted drill bit, the drill bit was moving here and there without starting drilling on the place to be drilled. What is the tool to be used to solve this problem?
- (1) Scriber (2) Steel ruler (3) Center punch (4) Hollow punch
11. It was unable to get a soft finish and good soldering when soldering two galvanized sheets together using soft soldering. It was observed that the reason for this situation was the uncleanliness of the soldering surfaces. What is the material used to clean the soldering surfaces?
- (1) Borax (2) Zinc Chloride (3) Hydrochloric acid (4) Resin
12. What is the tool that can be used to mark a parallel line to a edge of rectangular work item?
- (1) Steel ruler (2) Beveled square (3) Outside caliper (4) Jenny caliper
13. There are various types of fire that could occur at a workshop. What is the material that make fire type 'C'?
- (1) Oil (2) Air (3) Electric cables (4) Paper
14. Different motions can be seen in parts of a machine. The rotation around a point is
- (1) oscillation. (2) circular. (3) reciprocating. (4) linear.

15. Spark test is mostly used to identify the metal in mechanical technology. No spark was spread when a piece of metal is contacted with a rotating grinder. What is this metal?
- (1) Bronze (2) Mild steel
(3) Medium carbon steel (4) Cast iron
16. Which is the category that contains only non ferrous metals?
- (1) Mild steel, copper, brass, bronze
(2) Bronze, tool steel, platinum, silver
(3) Copper, brass, silver, platinum
(4) Platinum, copper, cast iron, aluminium
17. What are the tools to be used for successful riveting?
- (1) Riveting bit, twisted drill bit, ball pane hammer
(2) Riveting bit, ball pane hammer, diamond chisel
(3) Cross pane hammer, riveting bit, flat cold chisel
(4) Hollow punch, straight pane hammer, riveting bit
18. What is the sharpen angle of a flat cold chisel?
- (1) 60° (2) 75° (3) 90° (4) 120°
19. What is the supportive equipment used to fill the mould box with liquid metal when manufacturing larger cast goods?
- (1) Runner pin (2) Vent wire
(3) Strike off bar (4) Foundry ladles
20. What is the most suitable method to join two mild steel rods with 8 mm diameter and 10 cm length perpendicular to each?
- (1) Forge welding (2) Soft soldering
(3) Electric arc welding (4) Hard soldering
21. What is the method which apply undercoat first when finishing metal goods for safety and illumination?
- (1) Sand blasting (2) Mechanical illumination
(3) Electroplating (4) Painting
22. Producing a sound when a metal hits a hard surface is known as a 'physical property'. Accordingly, what are the types of metal used to make bells and large temple bells (gantara)?
- (1) Copper and steel (2) Brass and copper
(3) Bronze and brass (4) Steel and aluminium
23. The figure shows a
- (1) feeler gauge.
(2) screw pitch gauge.
(3) standard wire gauge.
(4) surface gauge.
- 
24. As an apprentice, what should you do first when you observe a current leakage on the bench drilling machine at the workshop?
- (1) Call for an electrician
(2) Inform the officer incharge of the workshop
(3) Test the current leakage
(4) Disconnect the electricity from main supply

25. What is the tool shown in this figure?



- (1) Straight snips (2) Curved snips (3) Scotch snips (4) Universal snips

26. The cooling fan and alternator of motor engines are operated by one belt. Which type of belt is used for this?

- (1) 'V' belt (2) Toothed belt (3) Flat belt (4) Round belt

27. What is the component that provides electricity to operate main lights of a motorcycle?

- (1) Battery (2) Magneto unit
(3) Rectifier and stabiliser (4) Ignition switch

28. What is the purpose of applying 'by pass' in a water cooling system with pumping method?

- (1) To increase the efficiency of cooling
(2) To flow water when the temperature control valve is closed
(3) To bring the engine to functioning temperature soon
(4) For the safety of radiator and hose pipes

29. In a vehicle with a sealed water cooling system the water level of the radiator decreases slightly, while the water level of the overflow tank increases slightly. What could be the immediate reason for this error?

- (1) Radiator being blocked
(2) Errors of pressure cap
(3) Errors of water pump
(4) Errors of temperature control valve

30. The pistons in engine cylinders of a vehicle are moving up and down. What is the major component supports this?

- (1) Cam shaft (2) Push rod (3) Piston rod (4) Crank shaft

31. Which type of gear wheel mechanism should be used to change the moving direction (rotating direction) of the drive shaft of a machine by 90°?

- (1) Bevel gear (2) Chain and sprocket
(3) Rack and pinion (4) Screw thread mechanism

32. What is the material used to make safety insulator which covers the middle electrode of a spark plug?

- (1) Cement (2) Porcelain (3) Plastic (4) Solid rubber

33. What is the most suitable power transmission method for the braking system of heavy vehicles?

- (1) Vacuum method (2) Hydraulic pressure system
(3) Mechanical system (4) Air pressure system

34. What is the component which helps to close an open valve again of motor vehicle engine?

- (1) Rocker (2) Push rod
(3) Valve spring (4) Cam shaft

35. The radiator cap should not be opened when the water is boiling in an over heated engine. What is the reason for it?

- (1) Water steam with high temperature can cause burnings
(2) Water in the cooling system can flow away
(3) Overflow tank may be damaged
(4) Fine tubes of radiator can be damaged

36. The main function of the capacitor used in an ignition system of a motorcycle, is
- (1) strengthening the current of ignition system.
 - (2) protecting the primary coil.
 - (3) avoiding burning of electrodes in spark plug.
 - (4) avoiding burning of contact points in ignition system.
37. What is the strategy used to avoid the water in the engine of motor vehicle getting frozen during the Winter?
- (1) Reducing the size of radiator
 - (2) Removing the heat control valve
 - (3) Changing the thickness of gasket cylinder head
 - (4) Applying antifreezer liquid
38. Though the controlling of heat of an engine is done by the cooling system, what is the other system that helps it?
- | | |
|------------------------|-----------------------|
| (1) Lubrication system | (2) Suspension system |
| (3) Charging system | (4) Braking system |
39. What is the voltage range that needed to create a spark between electrodes of spark plugs?
- | | |
|---------------------|-----------------------|
| (1) 4800 V – 5800 V | (2) 6800 V – 7200 V |
| (3) 7800 V – 9600 V | (4) 20000 V – 22000 V |
40. The correct order of process to be followed in removing, cleaning and refixing a spark plug should be
- (1) sand papering, washing with kerosene oil, adjusting the space, cleaning with air and fixing.
 - (2) washing with petrol, cleaning with wire brush, adjusting the space, cleaning with air and fixing.
 - (3) adjusting the space, cleaning with wire brush, cleaning with air, washing with petrol and fixing.
 - (4) cleaning with wire brush, washing using petrol, cleaning using air, adjusting the space and fixing.

* *

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வடிவமைப்பும் இயந்திரத் தொழினுட்பவியலும் I, II

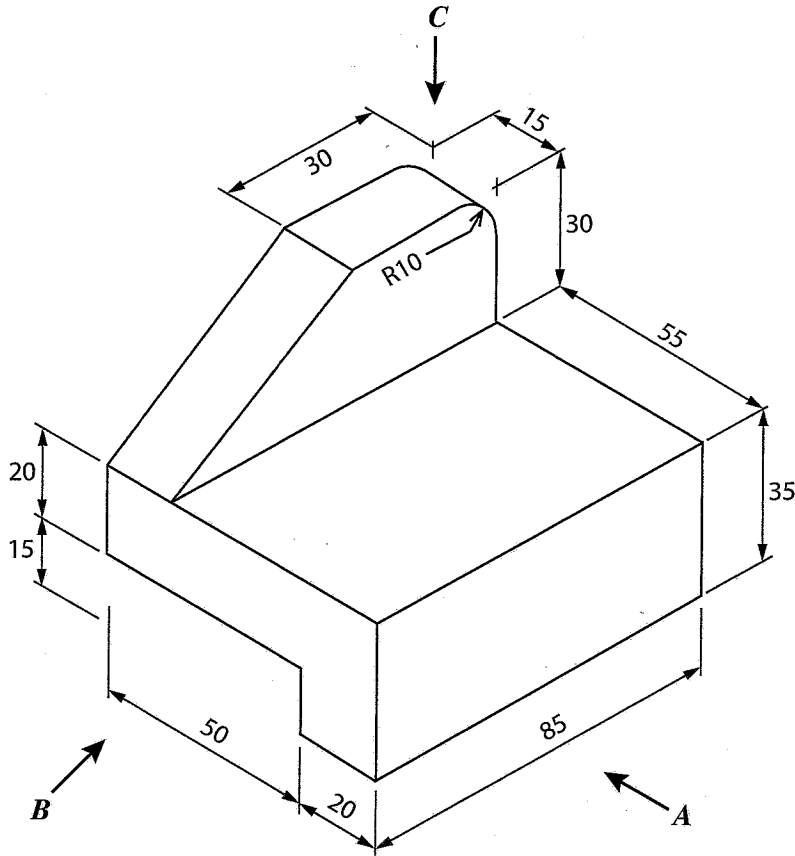
Design and Mechanical Technology I, II

Design and Mechanical Technology II

* Answer five questions including the first question and four other selected questions.

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

1. (i) The following figure shows an isometric view of an object.
(The figure is not drawn to a scale)



(All dimensions are in millimeters)

According to the above isometric view, draw the followings in third angle orthographic projection as per given measurement. The scale to be used is 1:1.

- (1) Front elevation by looking at arrow A,
- (2) Side elevation by looking at arrow B,
- (3) Plan by looking at arrow C.

- (ii) Construct a tangent to a circle with 30 mm radius from an external point of 90 mm distance to the center of circle.

2. It is dangerous to ride a motor bicycle without lifting the side stand support.
 - (i) Describe the process of designing a method/assembly to indicate the rider by a signal when the side stand support is not lifted.
 - (ii) Draw a rough sketch of the method/assembly of above (i) and name the parts.
 - (iii) Explain the functioning process of your method/assembly using the above (ii) rough sketch.
3. Transportation of the power from one place to another is known as power transmission.
 - (i) Describe in brief **three** methods of power transmission.
 - (ii) Describe **two** occasions with examples, of using hydraulic pressure for power transmission.
 - (iii) State **four** special characteristics which can be seen in power transmission using hydraulic pressure.
4. Production of goods using thin metal sheets has been done since the past.
 - (i) Describe by drawing a diagram the method of designing a small hand shovel which is to be used for collecting garbage.
 - (ii) Prepare **two** separate lists of materials and instruments that are to be used for the design in above (i).
 - (iii) Describe in brief **two** problems faced while production of hand shovel and **two** suitable solutions for it.
5. Different welding methods are mostly used to join metal parts permanently.
 - (i) State **three** specific characteristics that can be seen in welding process of joining metals.
 - (ii) Describe the Left hand welding and the Right hand welding separately.
 - (iii) Describe with diagrams, the protective welding process of two mild steel flat bars with 12 mm thickness and 15 cm length joined by keeping edges together to form a strong joint, in order to make total length of 30 cm.
6. Use of aluminium bars and sheets to fulfil the human needs is popular nowadays.
 - (i) Prepare a list of **five** tools and equipment that are used for the production of aluminium goods.
 - (ii) Explain the reasons for the producing of aluminium bars in differences shapes and with hollows.
 - (iii) Draw a sketch of a aluminium good that you have seen and prepare a list of materials used to produce it.
7. Different tools, equipment and materials are used in designing, producing and finishing of metal good.
 - (i) State **three** methods of classifying the tools and equipment on their uses.
 - (ii) Name **two** tools and equipment of each of categories of above (i).
 - (iii) Describe **five** actions and precautions to be adopted in order to minimize the harms for tools and equipment and their users.

* * *