90 E I, II

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2023(2024)
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2023(2024)
General Certificate of Education (Ord. Level) Examination, 2023(2024)

නිර්මාණකරණය, විදුලිය හා ඉලෙක්ට්‍රොනික තාක්ෂණවේදය	**I, II**
வடிவமைப்பும் மின் இலத்திரனியல் தொழினுட்பவியலும்	**I, II**
Design, Electrical & Electronic Technology	**I, II**

පැය තුනයි
மூன்று மணித்தியாலம்
Three hours

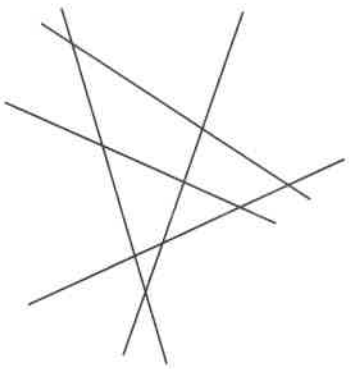
අමතර කියවීම් කාලය - මිනිත්තු 10 යි
மேலதிக வாசிப்பு நேரம் - 10 நிமிடங்கள்
Additional Reading Time - 10 minutes

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

Design, Electrical & Electronic Technology I

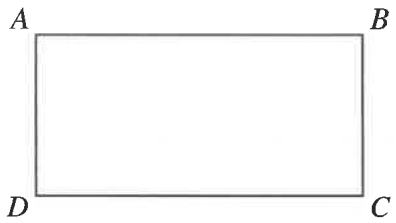
Instructions:

* *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*** **(×)** ***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.*

1. 

The figure shows the arrangement of five ekels when they are dropped on to a table by accidentally. The geometrical shapes that can be seen on the figure are

(1) triangles and squares.
(2) squares and pentagons.
(3) triangles and rectangles.
(4) pentagons and hexagon.

2. 

The geometrical shape that can draw to just touch the all four lines *AB*, *BC*, *CD* and *DA* of the given rectangle is

(1) an isosceles triangle.
(2) a scalene triangle.
(3) a circle.
(4) an ellipse.

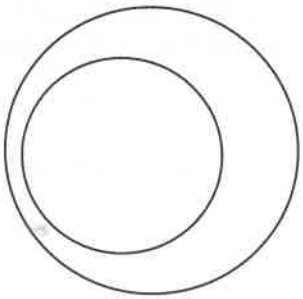
3. What is the factor that unable to draw a circle when only one of the factor is given from the following?

(1) Center (2) Radius (3) Diameter (4) Circumference

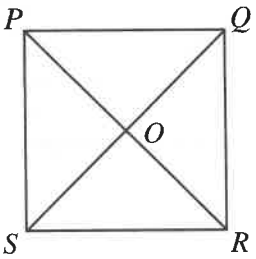
[*see page two*

4. Three statement are given in relation to the figures *L*, *M* and *N* below.

L



M



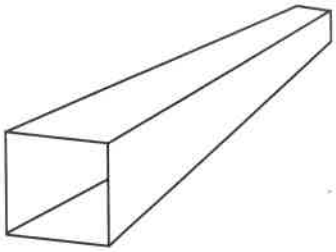
N

A – It is unable to find the center to draw arc *L* at all.
B – There are two separate centers for each two circles at figure *M*.
C – *O* should be used as the center to draw a circle which just touches the points of *PQRS* square in figure *N*.

The correct statements are

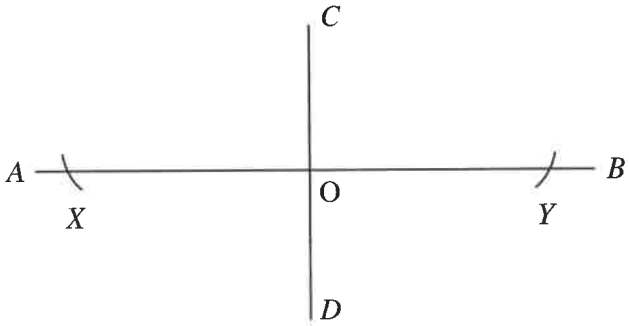
(1) A and B only.
(2) A and C only.
(3) B and C only.
(4) all A, B and C.

5. What is the method used to draw the following figure?



(1) Orthographic projection method
(2) Isometric projection method
(3) Perspective method
(4) Non standard method

6. In the following figure, $AO = OB$ and $CO = OD$.



Initially the lines and points are marked to construct an ellipse on it and the distance between points *X* and *Y* is

(1) length of major axis.
(2) length of minor axis.
(3) distance between two focuses.
(4) length of guide axis.

7. Consider the following statements.

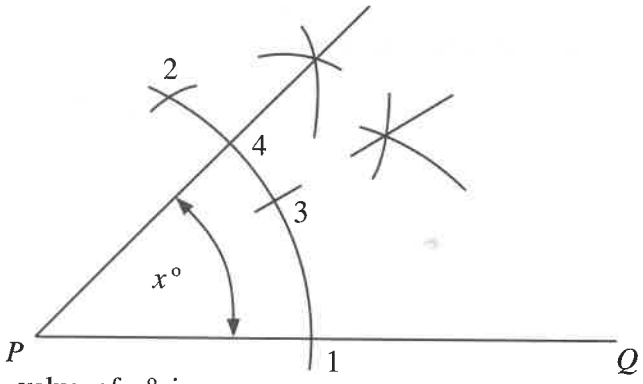
A – The angle between a tangent and a radius drawn to the tangent point is 90°.
B – The scale fraction is always stated as a ratio of small measurement to a large scale.
C – Only two adjacent units which belongs to a same species can be used in simple measurement.

Out of the above, the correct statements are

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

[see page three

8. The following figure shows a construction of an angle using only the compass, ruler and pencil.



The value of x° is

(1) 15°. (2) 30°. (3) 45°. (4) 60°.

9. The value of mean square in an Alternative current supply stated as 220 V. The Maximum (Peak) value of this is

(1) 311 V. (2) 325 V. (3) 400 V. (4) 440 V.

10. The specification of a conductor, which is used as earth electrode in a house wiring is

(1) 1/1.13 mm CU/PVC/PVC. (2) 7/0.67 mm CU/PVC/PVC.
(3) 7/0.67 mm CU/PVC. (4) 1/1.13 mm CU/PVC.

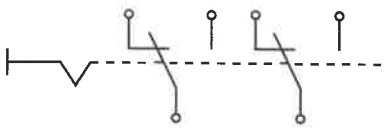
11. The diameter of a circular strand (wire) is 0.7 mm. What is the code for a cable which is constructed using such 7 strands (wires)?

(1) 0.7/7 (2) 1/7.7 (3) 7/0.7 (4) 7/0.07

12. What are the two elements that include in soldering lead?

(1) Sn/Pb (2) Mg/Pb (3) Sn/Mg (4) Fe/Pb

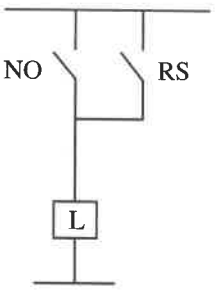
13. What is the type of switch that shown in the below symbol?



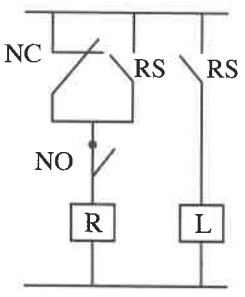
(1) SPST (2) SPDT (3) DPST (4) DPDT

14. What is the order of components installed at a correct self holding circuit?

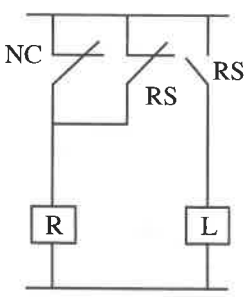
L – Load
NO – Normally Open Switch
NC – Normally Closed Switch
R – Relay
RS – Relay Switch



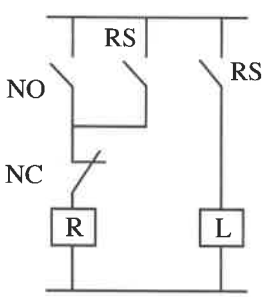
(1)



(2)



(3)



(4)

15. The element having low resistance and filled with more free electrons is called

(1) conductor. (2) insulator.
(3) semi conductor. (4) inductor.

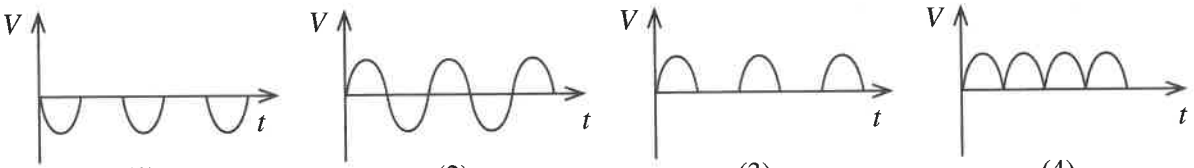
[see page four

16. What is the device that does **not** use permanent magnets?
(1) Speaker
(2) Direct current small motor
(3) Transformer
(4) Push-bicycle dynamo

17. Out of below devices, what is the device that is made out according to electro-magnetic function?
(1) Phone charger
(2) Relay
(3) Light dimmer switch
(4) LED bulb

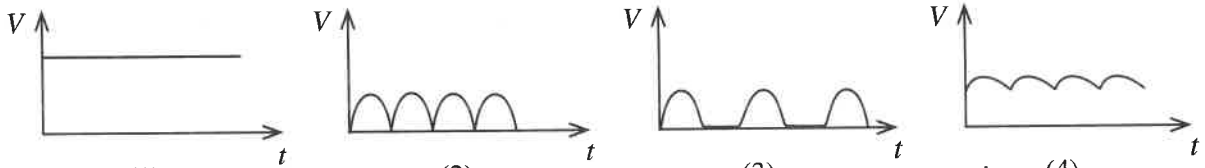
18. Consider the below statements.
A – Due to resistance of coils
B – Due to Eddy current of the core
C – Due to Hysteresis loss of the core
The power supplied to a primary coil in a transformer should be equal to the power received from the secondary, but practically it does not happen like this. The reasons for this out of the above are
(1) A and B only.
(2) A and C only.
(3) B and C only.
(4) all A, B and C.

19. What is the wave form when a diode is faulty (when open) of a bridge rectifier which used for rectification?



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

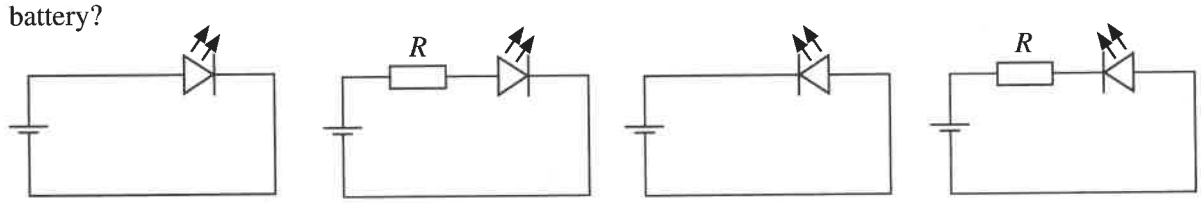
20. What is the graph that shows varying of output voltage in a non-load bridge rectifier circuit without a smoothing capacitor?



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

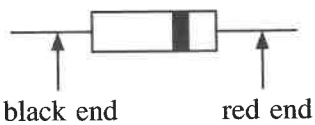
21. Energy stored as an electric field
(1) in a capacitor.
(2) in an inductor.
(3) in a variable resistor.
(4) in a resistor.

22. What is the figure correctly shown that a Light Emitting Diode (LED) which emitted by a 6 V battery?



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

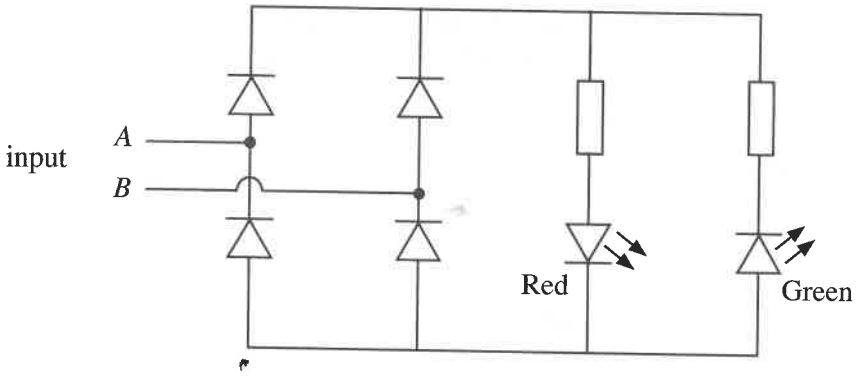
23. A rectifire diode 1N4007 is checked using ×l scale in Ohms range of an analogue multimeter as below:



During the check the reading was shown as 0 Ω. What is your conclusion regarding the diode?
(1) Diode is short circuit
(2) The diode is open circuit
(3) The diode is free of faulty
(4) Can't be expressed exactly

[see page five

24. Consider the following figure.



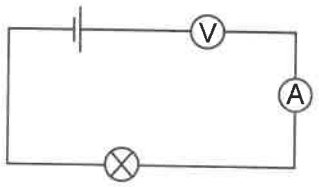
In accordance with the following two events, a direct current power supply is given to input of the circuit.

- End *A* Positive, End *B* Negative
- End *A* Negative, End *B* Positive

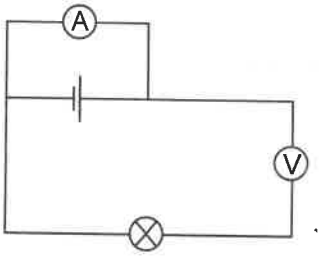
What is the correct statement regarding the light up of red and green LEDs in above two events?

(1) Out of the two LEDs, each one LED light up one by one
(2) The green LED lights up in both two events
(3) Both red and green LEDs light up in both two events
(4) The red LED lights up in both two events

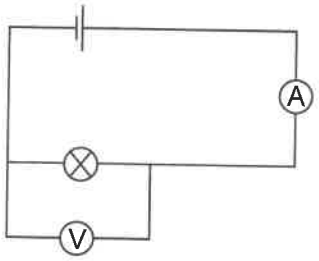
25. What is the correct way of connecting the relevant instruments to measure a current flowing through a direct current circuit and a voltage across the load?



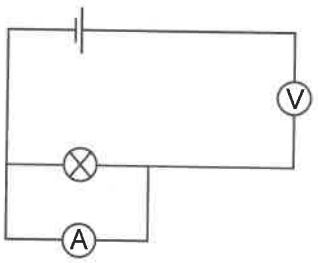
(1)



(2)



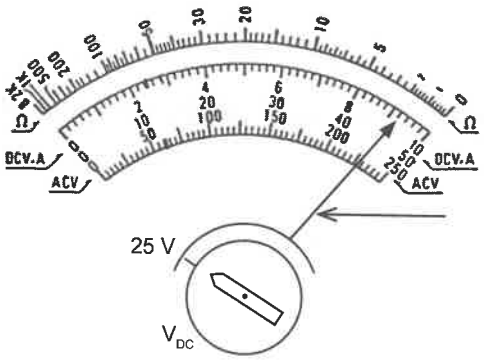
(3)



(4)

26. What is the reading according to the position of the indicator in the dial gauge shown below?

(1) 2.3 V
(2) 23 V
(3) 230 V
(4) 260 V

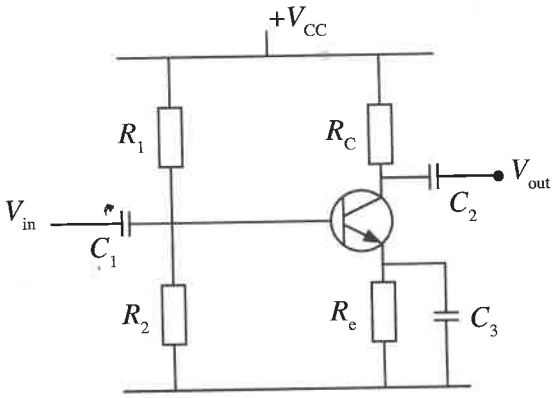


[see page six

27. When a transistor is used as a switch, two operations 'on and off' are shown in the characteristic curve respectively as

(1) saturated, cut off regions.
(2) cut off, active regions.
(3) active, saturated regions.
(4) saturated, active regions.

● Use the following circuit diagram to answer the questions **28, 29** and **30**.



28. What is the transistor biasing method used in this circuit?

(1) Fixed biasing
(2) Potential divider biasing
(3) Collector feedback biasing
(4) Emitter feedback biasing

29. This circuit is

(1) a tuned amplifier.
(2) a power amplifier.
(3) a small signal amplifier.
(4) a frequency filter circuit.

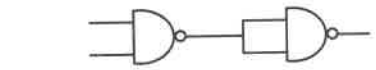
30. What is the purpose of C_1 and C_2 capacitors in this circuit?

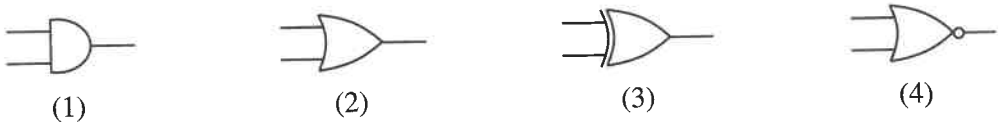
(1) Filtering high frequencies
(2) Blocking the step by step flow of direct current
(3) Filtering low frequencies
(4) Increase the ratio of signal to noice

31. What is the value when 37_{10} is converted to binary number?

(1) $101001_{(2)}$ (2) $100011_{(2)}$ (3) $100101_{(2)}$ (4) $110010_{(2)}$

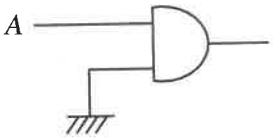
32. Which logic gate is equal to the logic circuit shown in the figure?





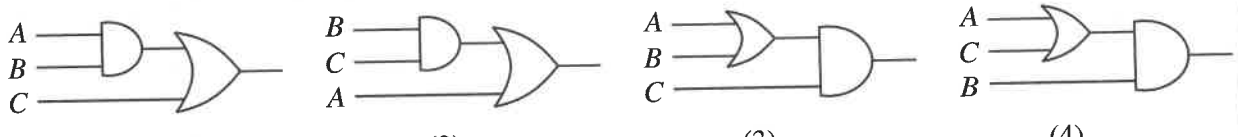
(1) (2) (3) (4)

33. What is the output of logic circuit shown in the figure?



(1) 0
(2) 1
(3) A
(4) $\overline{A}$

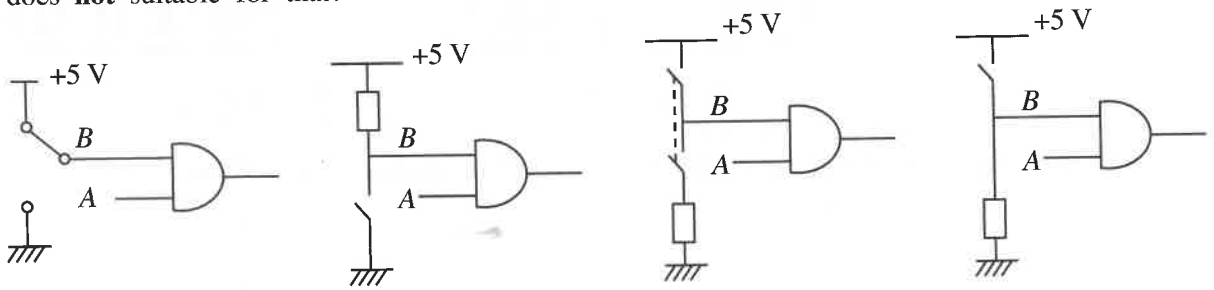
34. What is the logic circuit which can obtain the logic expression, $(A + B)C$?



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

[see page seven

35. The signal given to one input in AND gate, can be controlled by the other input. Which circuit does **not** suitable for that?

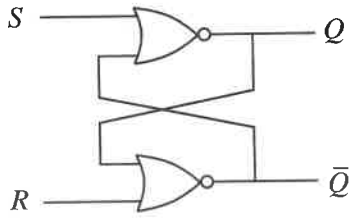


(1) (2) (3) (4)

36. Which integrated circuit can convert 0 – 9 digits in to binary numbers?

(1) 7447 (2) 7448 (3) 74147 (4) 74148

37. The figure shows a S – R flip flop. What is the truth table for Q and $\bar{Q}$ outputs?



(1)

S	R	Q	$\bar{Q}$
0	0	No change	
0	1	0	1
1	0	1	0
1	1	Previous	

(2)

S	R	Q	$\bar{Q}$
0	0	No change	
0	1	1	0
1	0	0	1
1	1	Previous	

(3)

S	R	Q	$\bar{Q}$
0	0	Previous	
0	1	0	1
1	0	1	0
1	1	No change	

(4)

S	R	Q	$\bar{Q}$
0	0	Previous	
0	1	1	0
1	0	0	1
1	1	No change	

38. Out of the below, which statement is correct regarding electromagnetic waves?

(1) Electric field and magnetic field are in parallel
(2) Electric field and magnetic field are intersect each other
(3) Electric field and magnetic field are perpendicular to each other
(4) Electric field and magnetic field flow in opposite directions

39. Due to which characteristics of electromagnetic waves, it is suitable for remote control?

(1) Electromagnetic waves are invisible
(2) Electromagnetic wave range has a low beam length
(3) It can transmit a signal to a distance place
(4) In each field the energy which can be stored is uneven

40. In the which motor that windings are **not** used in rotating parts of high rotating torque motors?

(1) Universal motor (2) Shunt motor (3) Induction motor (4) Synchronous motor

* *

[see page eight

90 E I, II

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2023(2024)
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2023(2024)
General Certificate of Education (Ord. Level) Examination, 2023(2024)

නිර්මාණකරණය, විද්‍යුලිය හා ඉලෙක්ට්‍රොනික තාක්ෂණවේදය	I, II
வடிவமைப்பும் மின் இலத்திரனியல் தொழினுட்பவியலும்	I, II
Design, Electrical & Electronic Technology	I, II

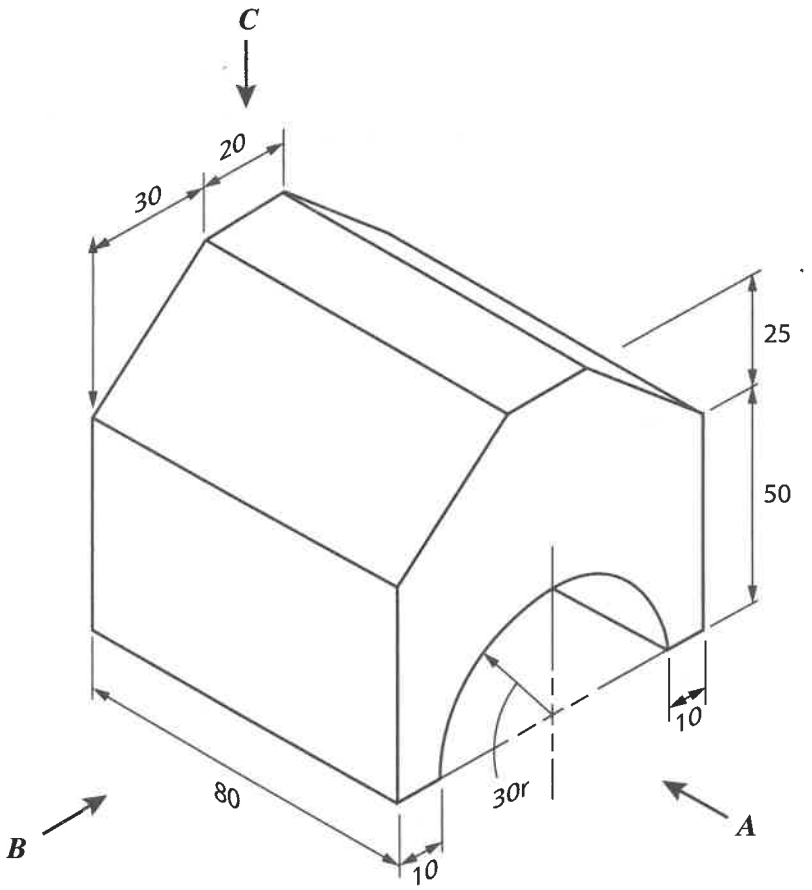
Design, Electrical & Electronic Technology II

* *Answer* ***five*** *questions including the* ***first*** *question and* ***four*** *other selected questions.*
* *Question No.***1** *carries* **20** *marks and each of the other questions carry* **10** *marks.*

1. (i) Look at the isometric figure given below.

Draw following ***A***, ***B*** and ***C*** according to the third angle method of orthographic projection principle in full scale as per given measurements.
(all measurement in millimeters)

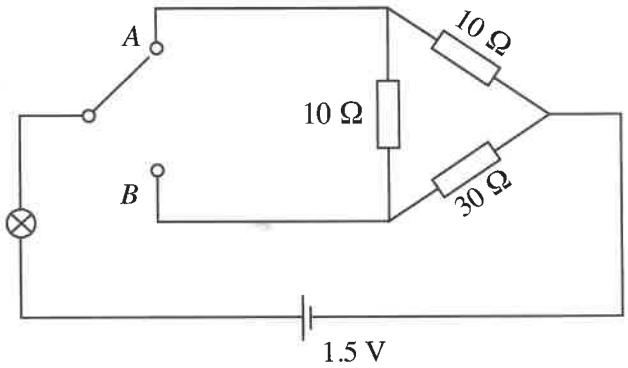
Front elevation from arrow ***A***
Side elevation from arrow ***B***
Plan from arrow ***C***



(ii) Draw a scalene triangle with your own measurement and construct the circumscribed circle of the triangle. Indicate the measurements you used in each side of the triangle.

[*see page nine*

2. Consider below circuit.



(i) Calculate the resistance of external circuit separately, when two way switch is selected to position *A* and *B*.

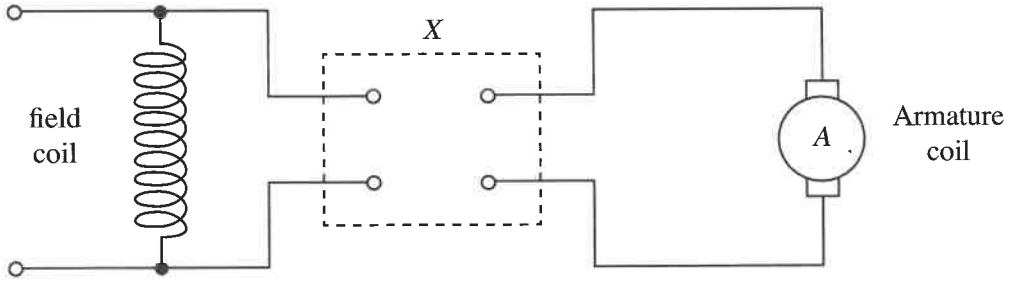
(ii) What is the position of the two way switch should be placed to increase the light of the lamp? Describe briefly.

(iii) Draw the circuit diagram again to show the way that an one way switch is used to switched off the lamp.

3. (i) State the Fleming's law regarding the motor action and write it.

(ii) Draw circuit diagrams of Shunt and Series wound Direct Current motors.

(iii) The following figure shows a motor circuit which is supplied magnetic field by using electro magnets. It is required to change the rotational direction from time to time. State the suitable device that should be connected to the position *X* and describe briefly.



4. A house wiring installation includes an electric lamp which can be controlled by two places and a 13 A socket outlet.

(i) Name the type of switch which is used in this electric lamp circuit.

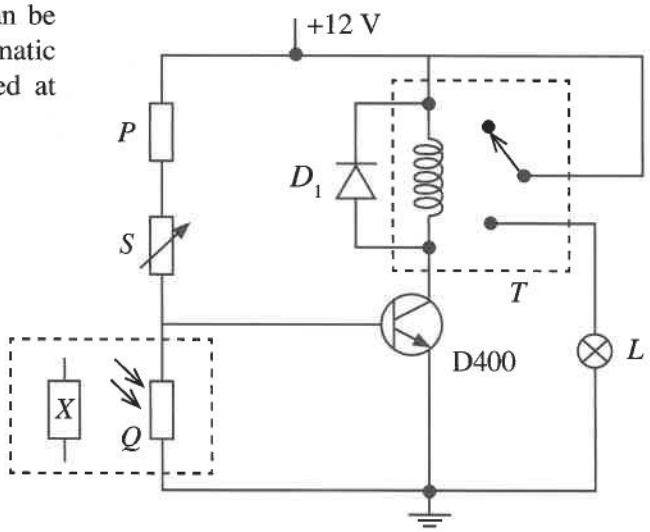
(ii) State the specifications of MCBs which can be used in this circuit.

(iii) State specifications of the cables which are used in socket outlet and electric lamp.

(iv) Draw the wiring diagram for this using standard symbols.

[*see page ten*

5. The following figure shows a circuit which can be used a 12 V charged battery to light up an automatic lamp when main power supply is disconnected at night.



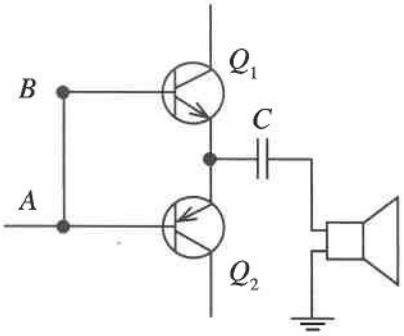
(i) Name a component that can be used for X.

(ii) What is T? Describe the purpose of it.

(iii) Describe the reason to use D_1.

(iv) Describe briefly the function of this circuit.

6. The figure shows a circuit consisting two transistors with possibility to amplify positive and negative half cycles of a signal.



(i) Describe briefly, how to amplify the signal using polarity of biasing voltages applied to base of both transistors.

(ii) Explain the purpose of C.

(iii) What is the voltage that should be applied between AB to provide direct current biasing for both transistors?

7. Draw a gate circuit for the following equation.

$Z = \bar{A}B + A\bar{B}$

(i) Write the truth table for the above output.

(ii) What is the logic gate to obtain the output according to the truth table above (i)?

(iii) Write an instance that this logic gate used practically, according to the truth table above (i).

* * *

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