

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, 2021(2022)
 கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2021(2022)
 General Certificate of Education (Ord. Level) Examination, 2021(2022)

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

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පැය තුනයි
 மூன்று மணித்தியாலம்
 Three hours

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

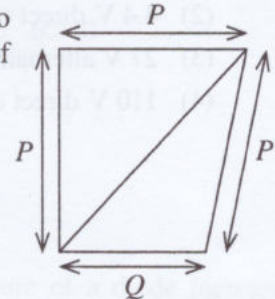
Use additional reading time to go through the question paper, select the questions and decide on the questions that you give priority in answering.

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 (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.

1. Two triangles are also shown due to the diagonal which connect two vertices of the quadrilateral shown in the figure. What are the types of those triangles according to the data shown on the figure?



- (1) An isosceles triangle and scalene triangle.
- (2) Two isosceles triangles.
- (3) An equilateral triangle and an isosceles triangle.
- (4) Two scalene triangles.

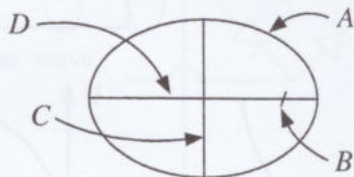
2. It is needed to enwrap and paste 10 plies of strings around an empty can which is 140 mm in diameter to make an ornamental product. The total length of the string required for this purpose is

- (1) 440 mm.
- (2) 2200 mm.
- (3) 4200 mm.
- (4) 4400 mm.

3. Value of an internal angle of a regular polygon is 108° . Accordingly, this polygon is a

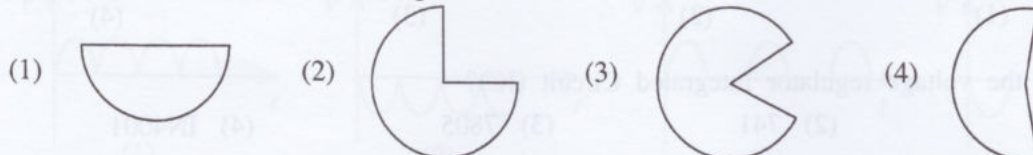
- (1) rectangle.
- (2) pentagon.
- (3) hexagon.
- (4) heptagon.

4. A diagram of an ellipse is shown below. What is the choice that A, B, C and D parts in the diagram are respectively and correctly indicated?



- (1) Locus, Focus, Minor axis, Major axis
- (2) Focus, Locus, Major axis, Minor axis
- (3) Minor axis, Major axis, Focus, Locus
- (4) Major axis, Minor axis, Locus, Focus

5. In order to make an artistic creation, a quadrant of a circle was cut and removed. What is the figure which remains after cutting?



(1)

(2)

(3)

(4)

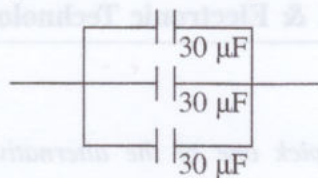
6. What is the set of geometrical tools used to divide a line of 8 cm length into 5 equal parts?
- (1) Two set squares, protractor and ruler
 - (2) Two set squares, pencil and divider
 - (3) Protractor, pencil and divider
 - (4) Two set squares, protractor and pencil

7. What is the colour code of a 180 kΩ resistor if the tolerance is 10%?
- (1) Brown, gray, yellow, silver
 - (2) Brown, black, yellow, silver
 - (3) Brown, blue, orange, gold
 - (4) Brown, black, orange, silver

8. What is the reason to produce resistors in various sizes, in the same colour code?
- (1) For easy production
 - (2) To withstand various power dissipation
 - (3) To be used on printed circuit boards
 - (4) To make the soldering process easy

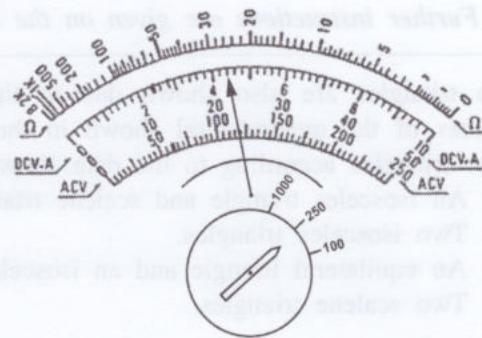
9. What is the equivalent capacitance of the capacitor circuit shown in the figure?

- (1) 10 μF
- (2) 30 μF
- (3) 60 μF
- (4) 90 μF



10. Following figure illustrates a face of an analog multimeter. What is the value according to the position of the indicator?

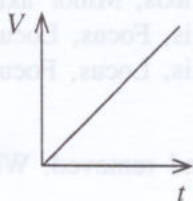
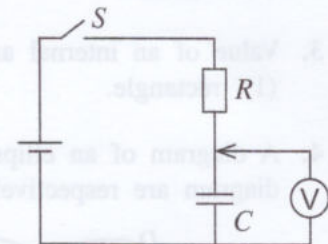
- (1) 4.4 V alternating current
- (2) 4.4 V direct current
- (3) 27 V alternating current
- (4) 110 V direct current



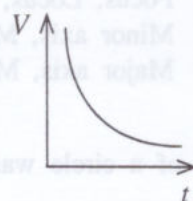
11. What should be the minimum output voltage of a charger prepared to charge a lead-acid battery with 6 cells?

- (1) 12 V
- (2) 14 V
- (3) 20 V
- (4) 24 V

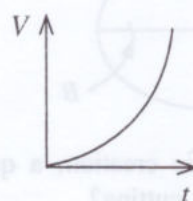
12. Which graph indicates the increase of voltage with time, when S switch is closed in the shown circuit figure?



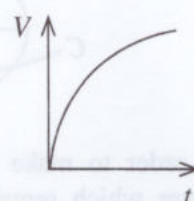
(1)



(2)



(3)

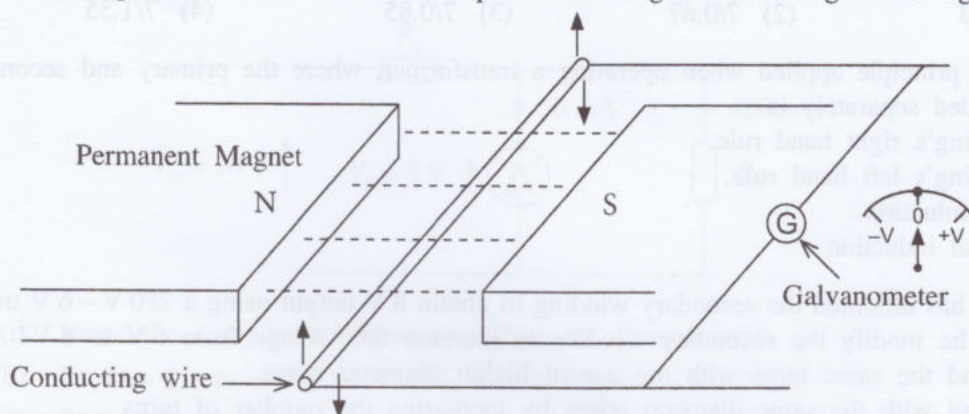


(4)

13. What is the voltage regulator Integrated Circuit (IC)?

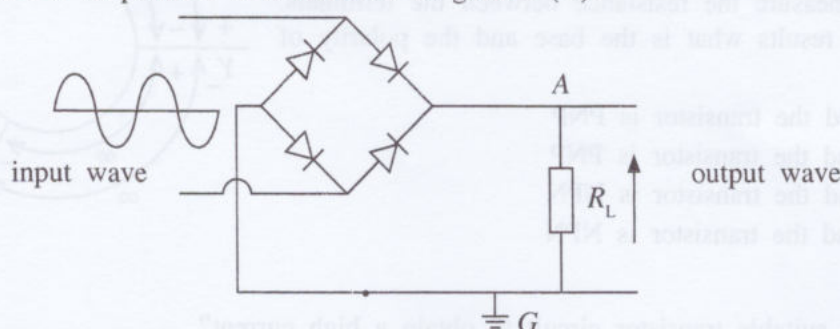
- (1) 555
- (2) 741
- (3) 7805
- (4) IN4001

14. A conducting wire is held between two permanent magnets according to the figure shown.

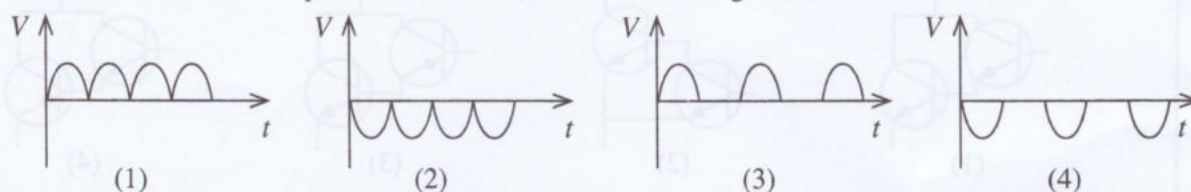


The wire moves up and down, perpendicular to the magnetic field. The reading in the Galvanometer is

- (1) zero.
 - (2) moving to both sides from zero.
 - (3) moving only towards -V direction.
 - (4) moving only towards +V direction.
15. When operating a series LED system using a 230 V alternating voltage, the voltage should be reduced to an appropriate voltage value. What is the most suitable device to be connected in series for that?
- (1) A resistor
 - (2) A diode
 - (3) A wire coil
 - (4) A capacitor
16. What is the Tin/Lead ratio in soldering lead?
- (1) 25/75
 - (2) 40/60
 - (3) 50/50
 - (4) 60/40
17. Which losses are identified as core losses in a transformer?
- (1) Eddy current losses and losses due to the resistance in wires
 - (2) Hysteresis losses and losses due to the resistance in wires
 - (3) Heat losses and Hysteresis losses
 - (4) Eddy current losses and Hysteresis losses
18. What is the reason for the increase in leakage current, when the temperature of a diode increases?
- (1) To let it cool down
 - (2) Because of the creation of holes due to the emission of electrons from silicon atoms
 - (3) Because the bonds between silicon atoms are removed
 - (4) Because the forward resistance of the diode is increased
19. When a sinusoidal wave is given to a bridge rectifier as shown in the figure, the output wave is formed in point A with reference to ground (G).

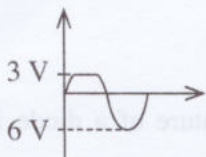
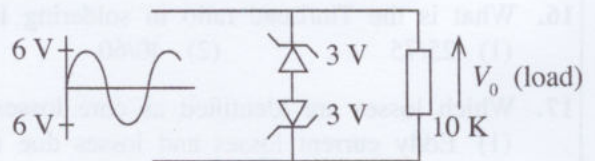


What should be the output wave out of the wave forms given below?

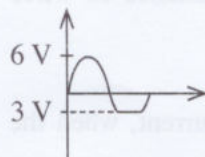


20. Which wire is used for a 13 A socket outlet in a house wiring?
 (1) 1/1.13 (2) 7/0.67 (3) 7/0.85 (4) 7/1.35
21. The main principle applied when operating a transformer, where the primary and secondary coils are wound separately is
 (1) Fleming's right hand rule.
 (2) Fleming's left hand rule.
 (3) self induction.
 (4) mutual induction.
22. A student has modified the secondary winding to obtain 8 V output using a 230 V – 6 V transformer. How did he modify the secondary winding to increase the voltage from 6 V to 8 V?
 (1) Wound the same turns with the use of higher diameter wires
 (2) Wound with the same diameter wires by increasing the number of turns
 (3) Change the pattern of the winding with the same number of turns
 (4) Wound with the same number of turns by changing the conducting material from copper to another material
23. What is the purpose of using an earth wire for a house wiring circuit?
 (1) To protect the circuits from high voltage
 (2) To protect from an electrical shock
 (3) To protect from lightning
 (4) To reduce the electricity bill

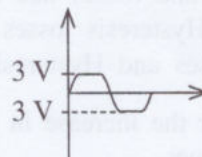
24. What is the voltage wave form across the load?
 (neglect the forward bias voltage of the diodes)



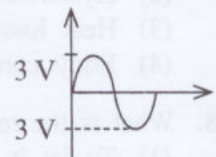
(1)



(2)

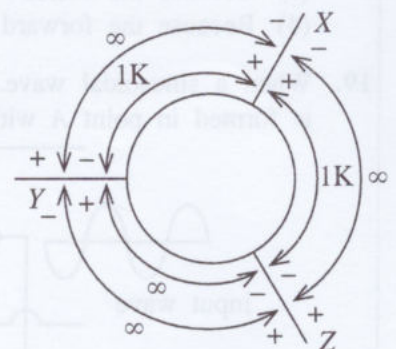


(3)



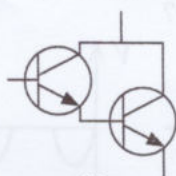
(4)

25. A transistor terminals cannot be identified. The figure shows the resistance between the terminals (X, Y, Z) of that transistor when the + (positive) and - (negative) voltages are applied using a multimeter to measure the resistance between the terminals. According to the results what is the base and the polarity of the transistor?

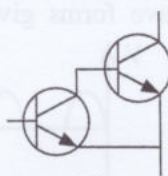


- (1) Base is Y and the transistor is PNP
 (2) Base is X and the transistor is PNP
 (3) Base is Z and the transistor is NPN
 (4) Base is X and the transistor is NPN

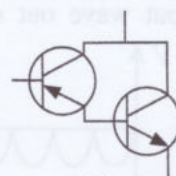
26. What is the most suitable transistor circuit to obtain a high current?



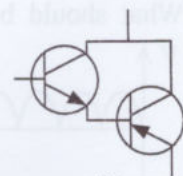
(1)



(2)



(3)

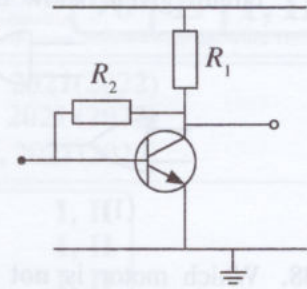


(4)

● Use the following circuit diagram to answer questions No. 27 and 28.

27. Which of the following factors is to be fulfilled to achieve active condition of a transistor?

- (1) $R_2 = R_1$
- (2) $R_1 > R_2$
- (3) $R_1 < R_2$
- (4) Another resistor must be connected to the base

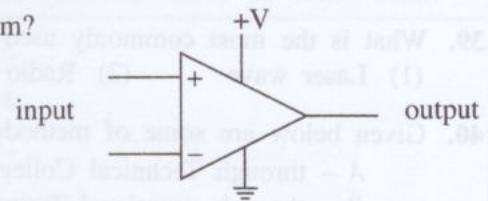


28. Which is the correct statement with regard to the circuit?

- (1) Can only be used as a switch
- (2) Can be used as a switch and an amplifier
- (3) Can only be used as an amplifier
- (4) The application of the circuit will change based on R_1 and R_2

29. Symbol of which device has been shown in the diagram?

- (1) Oscillator
- (2) Timer circuit
- (3) Summing amplifier
- (4) Operational amplifier



30. What is NOT an Ideal characteristic of an operational amplifier?

- (1) Infinite input impedance
- (2) Zero output impedance
- (3) Constant supply voltage
- (4) Infinite open loop gain

31. What is the component which can be easily used as an Astable Multivibrator?

- (1) LM 35
- (2) 1N 4007
- (3) NE 555
- (4) 741

32. What is the easiest way for the user to convert decimal to binary code?

- (1) Using after converting from decimal to octal and then binary
- (2) Using after converting from decimal to hexa decimal and then binary
- (3) Using after converting the overall decimal value to binary
- (4) Using after converting binary coded decimals

33. What is the decimal value of 10101_2 ?

- (1) 10
- (2) 17
- (3) 20
- (4) 21

34. What is the symbol of X-OR gate?



(1)



(2)

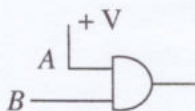


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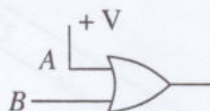


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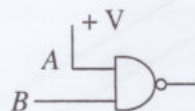
35. What is the logic circuit to obtain the relationship $A \cdot B = B$?



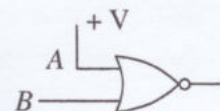
(1)



(2)



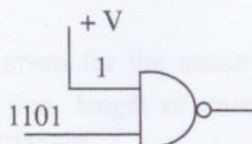
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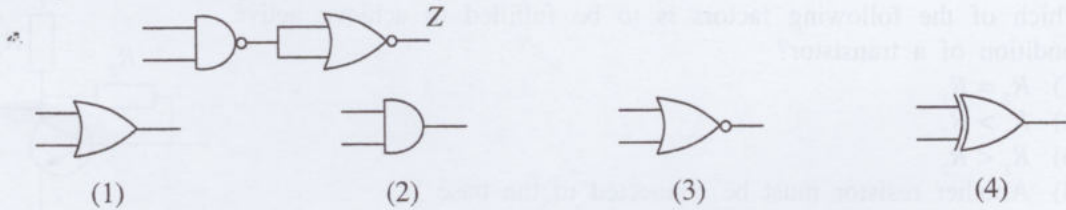
(4)

36. What is the output value when logic 1101 inputted to the circuit given below?

- (1) 1001
- (2) 0010
- (3) 1010
- (4) 0011



37. To which logic gate's truth table is the truth table of the output of the combinational logic gate circuit given below equal?



38. Which motor is **not** an alternating current motor?

- (1) The motor that pumps water to the domestic water tanks
- (2) Motor of a grinding mill that grinds chilli, flour etc.
- (3) The motor fixed in drilling machines used in drilling wood, iron etc.
- (4) Wiper motor used in vehicles

39. What is the most commonly used wave to control drones?

- (1) Laser wave
- (2) Radio wave
- (3) Light wave
- (4) Sound wave

40. Given below are some of methods, in which a person gets vocational training.

- A - through Technical Colleges
- B - through vocational Training Institutes
- C - through crafting methods inherited by previous generations
- D - through self learned and developed crafting methods
- E - through practical knowledge gained from friends

What are the assessed competencies from the given above when obtaining an NVQ certificate through Recognition by Prior Learning (RPL)?

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

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සියලු ම හිමිකම් ඇවිරිණි / முழுப் பதிப்புரிமையுடையது / All Rights Reserved

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අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2021(2022)
 கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2021 (2022)
 General Certificate of Education (Ord. Level) Examination, 2021 (2022)

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

Design, Electrical & Electronic Technology II

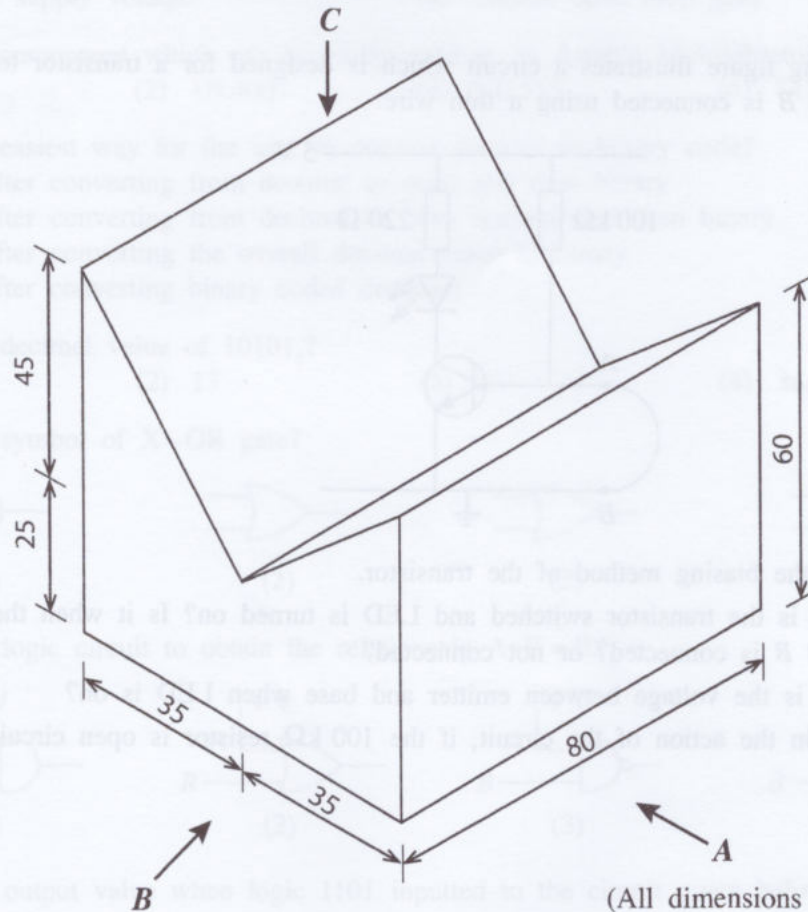
* Answer five questions including the first question and four others selected questions.

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

1. (i) According to the isometric figure given below, draw

- (1) Front elevation seen through direction A,
- (2) Side elevation seen through direction B,
- (3) Plan seen through direction C,

Using third angle orthographic projection principles to full scale as per the given dimensions.
 (Given drawing is not to scale)



(All dimensions are in millimeters)

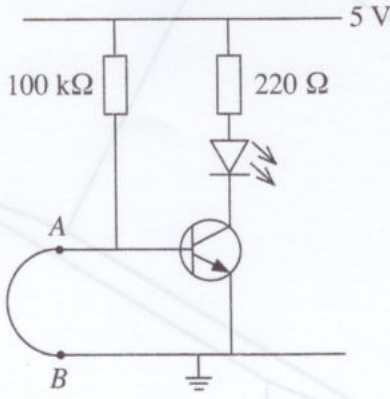
(ii) Below dimensions are given for the construction of a triangle.

Length of one side 90 mm, length of another side 50 mm and the length of the third side 60 mm. Construct the triangle.

2. The stage screen of the main assembly hall of a school, is operated by using a wiper motor.
 - (i) Name the switch to be used to open and close this stage screen.
 - (ii) Draw the circuit with the motor and switch named above.
 - (iii) State **two** methods that can be used for the input supply, to operate the motor.
 - (iv) State another type of a motor or a mechanical method which can be used to open and close the screen.

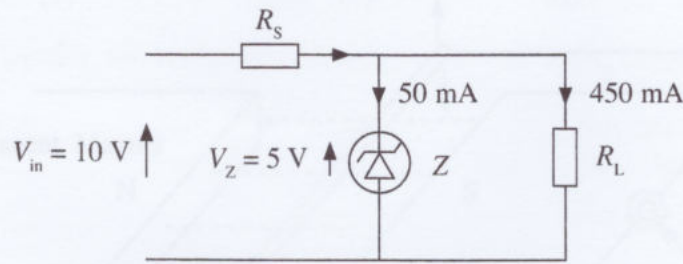
3. An electrical circuit should be installed with 13 A socket outlet and four lamps, which needs to be operated by CEB power.
 - (i) Prepare the list of items needed for the circuit.
 - (ii) Draw the block diagram of the circuit with the main components.
 - (iii) Draw the complete circuit diagram for the circuit.

4. A relay having two normally open contacts is used to control an electric motor.
 - (i) State **two** specifications that should be considered when you are going to buy a relay.
 - (ii) Draw a self holding circuit using a relay with two normally open contacts.
 - (iii) Briefly describe the operation of the above circuit (ii).
 - (iv) Briefly explain the advantage of using self holding circuit to control a motor with a load.

5. The following figure illustrates a circuit which is designed for a transistor to work as a switch. Point A and B is connected using a thin wire.
 

- (i) State the biasing method of the transistor.
- (ii) When is the transistor switched and LED is turned on? Is it when the thin wire between A and B is connected? or not connected?
- (iii) What is the voltage between emitter and base when LED is on?
- (iv) Explain the action of the circuit, if the 100 kΩ resistor is open circuit.

6. Consider the below circuit.



- (i) Name the component indicated as Z in the above circuit.
 - (ii) Explain the necessity of the R_s resistor connected in series.
 - (iii) State **two** specifications to consider when you are going to buy the device Z.
 - (iv) When a 10 V dc power supply is applied to the circuit a 5 V voltage value is obtained across the device Z. Calculate the value of the series resistor R_s .
7. (i) Draw the symbol of 3 input NOR gate.
 (ii) Write the truth table and the Boolean equation relating above (i).
 (iii) Design 3 input NOR gate using two, 2 input OR gates and an inverter (NOT gate).
 (iv) State the method of prepare above (ii) circuit using AND gates and inverters (NOT gates).



What should be the output wave out of the wave forms given below?

