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

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

90 | E | I, II

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2019 දෙසැම්බර්
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2019 டிசெம்பர்
General Certificate of Education (Ord. Level) Examination, December 2019

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

06.12.2019 / 0830 - 1140

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

Note :

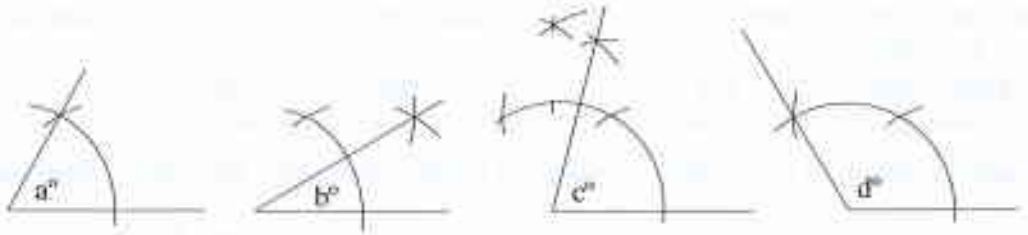
(i) *Answer **all** questions.*

(ii) *In each of the questions* **1** *to* **40**, *pick one of the alternatives* (1), (2), (3), (4) *which is **correct or most appropriate**.*

(iii) ***Mark a cross*** (×) ***on the number corresponding to your choice in the answer sheet provided.***

(iv) *Further instructions are given on the back of the answer sheet. Follow them carefully.*

1. Four angles constructed by using only the compass and a simple edge are shown below.



According to these sketches, the value of angles a°, b°, c°, d° respectively are

(1) 30°, 15°, 75°, 130°. (2) 30°, 15°, 80°, 120°.

(3) 60°, 30°, 75°, 120°. (4) 60°, 45°, 65°, 150°.

2. The geometrical figure consisting of two focuses is the

(1) circle. (2) oval shaped circle.

(3) parabola. (4) ellipse.

3. The four arcuate shapes are named as *A*, *B*, *C* and *D*. Some statements related to them are shown below.

P – One centre for all arcs.

Q – Arcs have four different centres.

R – Radiuses are equal.

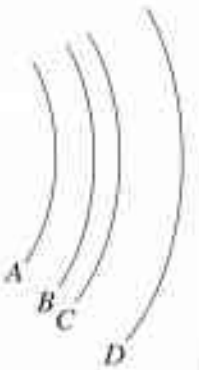
S – Radiuses are not equal.

T – These circular lines are parallel to each other.

Correct statements out of the above are

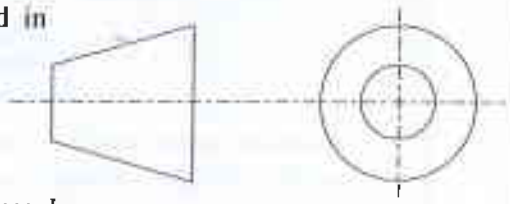
(1) P, Q and R only. (2) P, S and T only.

(3) Q, R and T only. (4) Q, S and T only.



|see page two

4. To identify the types of projections, this symbol is used in



(1) first angle projection.
(2) third angle projection.
(3) isometric projection.
(4) three dimensional projection.

5. The nature of a problem can be defined in design process by
(1) giving solutions to the problem. (2) analysing the problem.
(3) exploring the information. (4) selecting the appropriate solution.

6. The short written statement, clarifying the nature of the proposed solution is identified as the
(1) analysis of the problems. (2) summary of the design.
(3) proposed solution. (4) design specifications.

7. Properties which should be within a proposed solution (Ex.: Length, width, weight, type, aesthetic value) are included in
(1) summary of the design. (2) plan documents.
(3) design specifications. (4) proposed solutions.

8. The design process is done in several steps to
(1) analyse the solution. (2) give solutions to the problem.
(3) explore information. (4) select an appropriate solution.

9. What is the international unit used to measure electrical power?
(1) Henry (2) Khulomb (3) Watt (4) Watt-hour

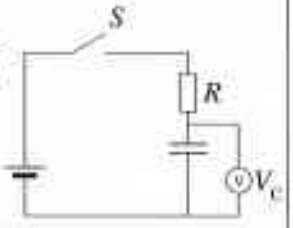
10. What are the main parts of an electrical soldering iron?
(1) Power supply cable, insulating handle, Nichrome coil, point
(2) Power supply cable, Nichrome coil, Soldering lead, point
(3) Point, Nichrome coil, soldering lead, flux
(4) Insulating handle, power supply cable, Nichrome coil, soldering lead

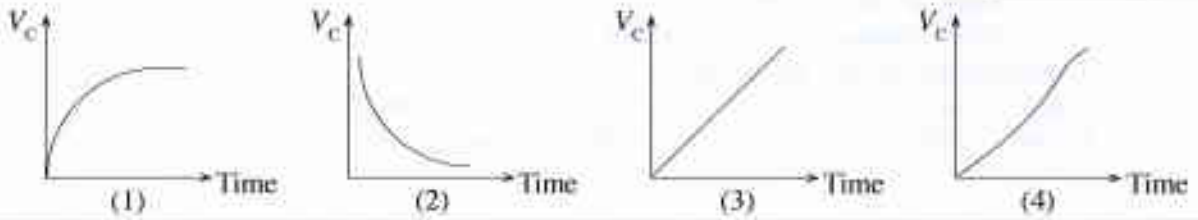
11. When colour code system is used with four colour strips, the colours to be used for the resistor of 4.7 Ω ± 5% are
(1) Yellow, Purple, Gold and Gold. (2) Yellow, Purple, Silver and Silver.
(3) Yellow, Purple, Silver and Gold. (4) Yello, Purple, Gold and Silver.

12. When two resistors 20 Ω and 30 Ω are joined in parallel connection, the value of equivalent resistance is
(1) 3 Ω. (2) 6 Ω. (3) 12 Ω. (4) 24 Ω.

13. What is the most correct statement for digital and analogue multimeter?
(1) The value of internal resistance is low in digital multimeter and high in analogue multimeter.
(2) The value of internal resistance is high in digital multimeter and low in analogue multimeter.
(3) The internal resistance in digital and analogue multimeter is equal.
(4) The internal power supply is necessary in every measurement, in both digital and analogue multimeters.

14. What is the graph that indicates the voltage (V_c) growth through the capacitor correctly according to the time, when the S switch is closed on the circuit?





[see page three

15. The value which is indicated by 230 V of the voltage wave in the domestic electricity supply, provided by Electricity Board is the
(1) maximum value. (2) minimum value.
(3) average value. (4) root mean square value.

16. In electrical wiring, the cables used for live wire and neutral wire are for 13 A, ordinary socket outlet,
(1) 1/1.13 PVC, PVC copper brown and blue.
(2) 1/1.13 PVC, copper red and blue.
(3) 7/0.50 PVC, PVC copper brown and blue.
(4) 7/1.04 PVC, PVC copper brown and blue.

17. What is the most suitable Miniature Circuit Breaker (MCB) used for a circuit with 13 A socket outlet?
(1) 6 A MCB (2) 10 A MCB (3) 16 A MCB (4) 20 A MCB

18. The output voltage in a secondary coil of a transformer is proportional to
(1) the length of core of transformer.
(2) the cross-sectional area of the core around which the coil is winded.
(3) the diameter of the wires in coil.
(4) the number of turns in the coil.

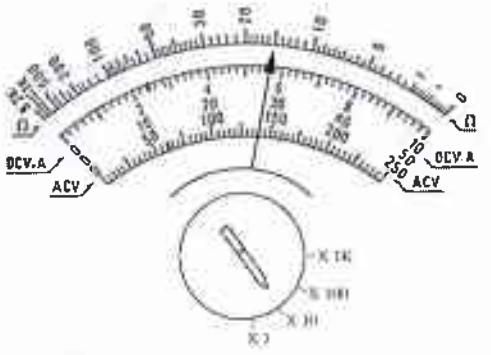
19. To operate a relay, the basic item in it should be
(1) an electro-magnet. (2) a resistor.
(3) a switch. (4) a capacitor.

20. Select the most suitable statement with reference to rotating a direct current motor.
(1) There should be two permanent magnets.
(2) There should be conductors with a flow of current in between the magnetic lines of force.
(3) A conductor should be moved in between the magnetic lines of forces.
(4) There should be a supply of alternating current.

21. What is the most suitable method of charging a Lead-Acid cell used in motor vehicles?
(1) Use an another charged cell.
(2) Use an instrument which converts direct current to an another direct current.
(3) Use an instrument which converts alternating current to direct current.
(4) Use an instrument which converts alternating current to another alternating current.

22. The losses which take place in a transformer are divided into two main parts. What are they?
(1) Copper losses and heat losses (2) Iron losses and eddy current losses
(3) Iron losses and hysteresis losses (4) Copper losses and iron losses

23. When measuring a resistance the position of the needle of the multimeter is shown in the figure.
According to the position of the needle, what is the value of the resistor?
(1) 1.5 Ω (2) 15 Ω
(3) 150 Ω (4) 1500 Ω



24. What is the forward biased voltage of a silicone diode?
(1) 0.2 V (2) 0.4 V (3) 0.6 V (4) 0.8 V

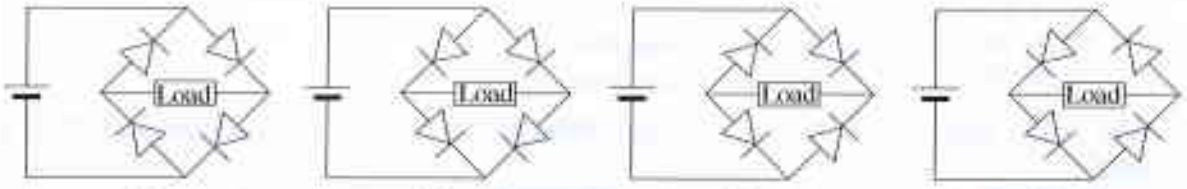
25. What is the diode which can be used for a voltage stabilized circuit?
(1) Rectifier diode (2) Point contact diode
(3) Zener diode (4) Light emitting diode

see page four

26. Out of the following, what is the symbol for PNP transistor?

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

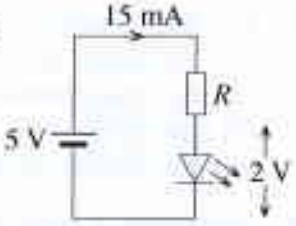
27. Although the connected terminals are interchanged on a direct current circuit, what is the correct circuit which could be connected to a Load?



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

28. What is the value of resistor which should be connected in series to light up LED using 5 V in the shown figure?

(1) 100 Ω (2) 200 Ω (3) 330 Ω (4) 470 Ω

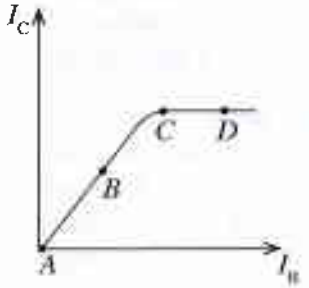


29. What is the main reason of converting an Alternating Current to Direct Current to operate a given circuit?

(1) To operate the circuit using low power
(2) To make it easy in calculating the current of the circuit
(3) To prevent leak of chemicals in the circuit
(4) To prevent the loss in changing the polarity of the circuit

30. The graph shows the form of change in the collector current with reference to the base current of a transistor. The best point to bias this transistor as an Amplifier is at

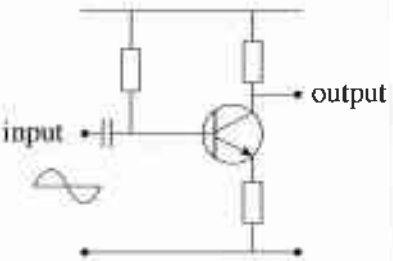
(1) *A*. (2) *B*. (3) *C*. (4) *D*.



31. What is the number of transistors necessary to connect as Darlington Method?

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

32. When sinusoidal wave is given to the input of the Amplifier circuit as shown in figure, if a loss free signal is received, what is the wave form of the output?



(1) (2)

(3) (4)

33. What symbol indicates NOR gate, out of the following?

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

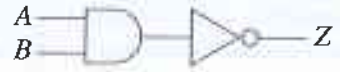
34. What is the gate, that can obtain the truth table given?

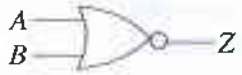
(1) XOR (2) OR
(3) NAND (4) NOR

A	B	Z
0	0	0
0	1	1
1	0	1
1	1	0

[see page five

35. To which gate function is the output of the circuit shown in figure equal?





(1)

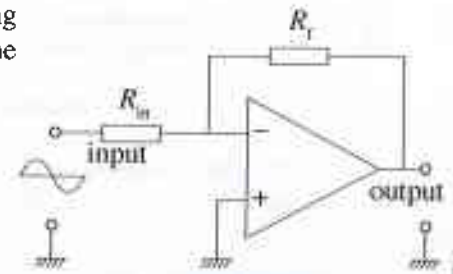
(2)

(3)

(4)

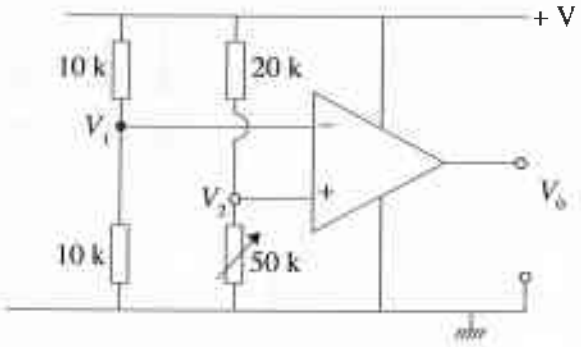
36. A circuit diagram of an operational amplifier used as an Inverting amplifier is shown here. What happens when the value of the resistor R_f is increased?

(1) Decrease the gain
(2) Decrease the gain with inversion
(3) Gain equals 1
(4) Increases the gain

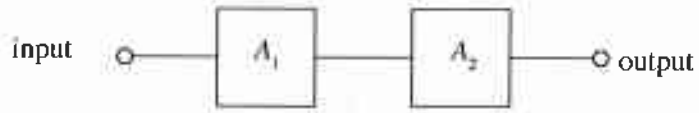


37. A circuit in which an operational amplifier is used as a comparator is shown below. Which statement is correct regarding the output of the circuit?

(1) when $V_1 > V_2$ the output is a + voltage.
(2) when $V_1 > V_2$ the output is a zero voltage.
(3) when $V_1 < V_2$ the output is a – voltage.
(4) when $V_1 < V_2$ the output is a zero voltage.



38. A_1 and A_2 are two single stage voltage divide biased amplifiers. What is the reason for **not** achieving the voltage gain of 4000, when the two amplifiers are connected in series?



(1) A_1 amplifier becomes a load to A_2 amplifier
(2) A_2 amplifier becomes a load to A_1 amplifier
(3) the gain of A_1 and A_2 is reduced when connected in series.
(4) the voltage is reduced because the supply should be given to both amplifiers

39. What is the **false** statement with reference to electro-magnetic waves?

(1) Travels at the speed of light and also travels in the vacuum.
(2) It is a type of wave formed, when an electrical field and a magnetic field are perpendicular to each other.
(3) Travels at the speed of sound and also travels in a vacuum.
(4) Travels more distance than the sound waves and can be used for remote controls.

40. According to what criteria has the training to be done when obtaining NVQ certificate?

(1) National competency standard
(2) Theory and practical parts in the syllabus
(3) Class books
(4) Practical parts in the syllabus

* *

[see page six

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

Department of Examinations, Sri Lanka
Department of Examinations, Sri Lanka

90 | E | I, II

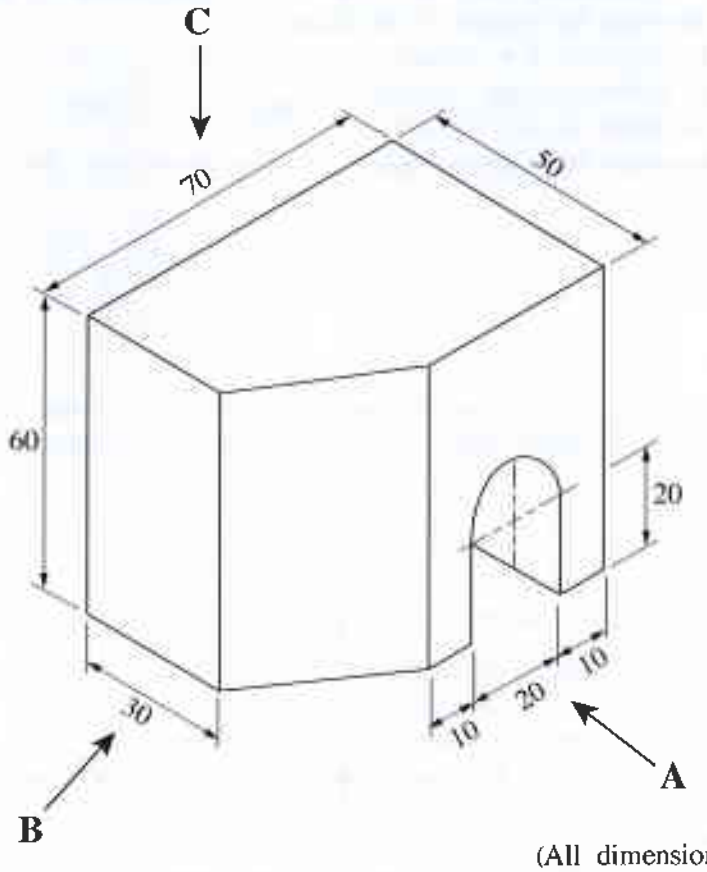
අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2019 දෙසැම්බර්
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2019 டிசெம்பர
General Certificate of Education (Ord. Level) Examination, December 2019

නිර්මාණකරණය, විදුලිය හා ඉලෙක්ට්‍රොනික තාක්ෂණවේදය I, II
வடிவமைப்பும் மின் இலத்திரனியல் தொழினுட்பவியலும் I, II
Design, Electrical & Electronic 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) Following figure shows an isometric view of an object.



(All dimensions are in millimetre.)

Draw the following views of above isometric drawing according to third angle projection.

Front elevation, seen through direction arrow **A**

Side elevation, seen through direction of arrow **B**

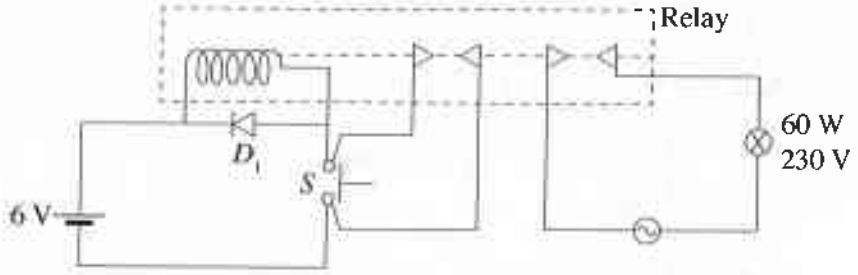
Plan, seen through direction of arrow **C**

Used scale should be 1:1.

(ii) Draw **two** circles with 25 mm radius of each with 100 mm distance between two centers and draw the common external tangent.

[see page seven

2. Figure shows an arranged circuit to control 230 V, alternating current lamp with a supply of Direct current 6 V and a push switch (*S*).



(i) Identify the function of D_1 Diode.

(ii) Describe the function of the above circuit.

(iii) Describe the main problem faced, when using these circuits.

(iv) Explain how that problem is solved.

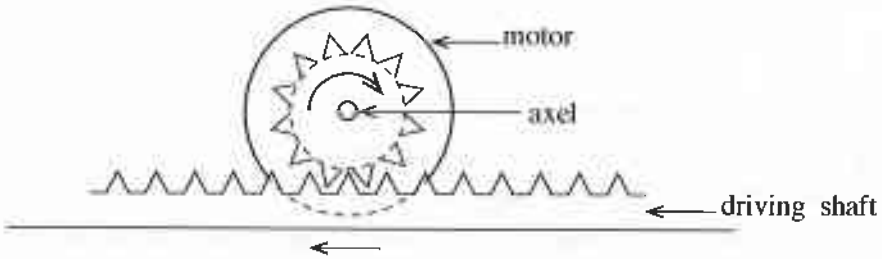
3. (i) Draw a labelled diagram of a Neon tester and name its parts.

(ii) Explain the function of a Miniature Circuit Breaker.

(iii) What is the value marked as 30 mA, in Residual Current Circuit Breakers (RCCB) used in domestic circuits? Explain

(iv) Draw a diagram of a circuit used to control a lamp at a staircase with two Single Pole Double Throw switches (SPDT) and name the parts.

4. The following diagram shows a methodology of converting a rotary motion into a linear motion.



(i) A Permanent Magnet Direct Current motor is used to obtain the rotary motion. What should be done to drive the driving shaft to both sides using the motor.

(ii) Name the switch which is to be used to obtain the above motion in (i).

(iii) Draw the circuit diagram with which the motor could be driven to both sides, by using the switch you suggest.

(iv) State another methodology, which could be connected to the axis of the motor to convert this motion.

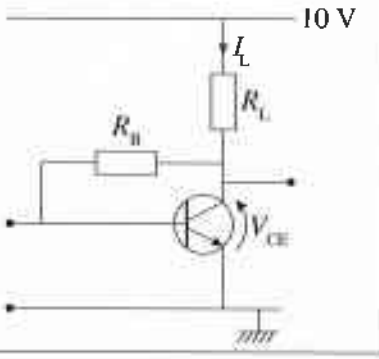
5. Figure shows a connection of a transistor to be used as an Amplifier.

(i) Name the form, how the transistor is biased.

(ii) What is the most suitable place, where the above biased amplifier in (i) can be connected in a multi stages amplifier?

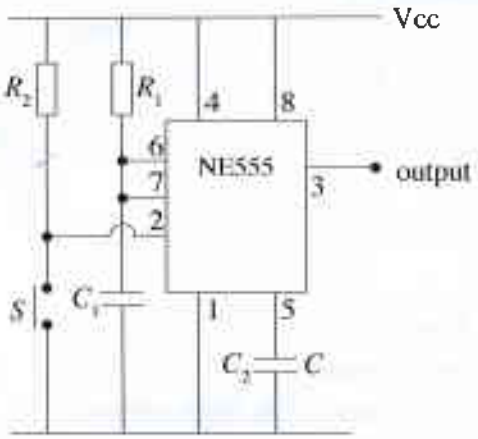
(iii) What is the value of I_L, if V_{CE} = 5 V and R_L = 1000 Ω?

(iv) Prepare a list of tools and equipment necessary, if this circuit is to be assembled on a copper strip board.



[see page eight

6. The diagram below, shows a monostable multivibrator using a NE 555 Integrated Circuit.



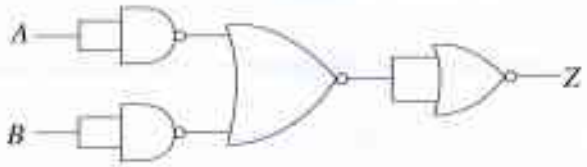
(i) What is a monostable multivibrator?

(ii) According to the definition of (i) when *S* push-switch is closed for a moment and opened, what is the shape of the output signal?

(iii) Which accessories should change their its values, to change the time of the output signal?

(iv) Describe an occasion that this circuit can be applied.

7. A combinational logic gate circuit is given below.



(i) Name the logic gates in the above circuit.

(ii) Write the Boolean expression for the output *Z*.

(iii) Write the truth table for the output *Z*.

(iv) What is the single gate which can be used to obtain the output of the above circuit?

* * *