

Answer all the questions.

Each question is followed by four options lettered A to D. Find the correct option for each question and shade in pencil, on your answer sheet, the answer space which bears the same letter as the option you have chosen. Give only one answer to each question.

An example is given below.

A. C. generators are rated according to their maximum

- A. true power.
- B. voltage.
- C. current.
- D. apparent power.

The correct answer is apparent power, which is lettered D, and therefore answer space D would be shaded.

[A]

[B]

[C]

☒ [D]

Think carefully before you shade the answer spaces; erase completely any answer(s) you wish to change.

Do all rough work on this question paper.

Now answer the following questions.

1. The energy stored in a capacitor is expressed as

- A. $\frac{1}{2}CV^2$ joules.
- B. $\frac{1}{2}C^2V$ joules.
- C. $2CV^2$ joules.
- D. $2C^2V$ joules.

2. When a resistor is added to a resistive series circuit, the resistance of the circuit

- A. increases.
- B. decreases.
- C. remains the same.
- D. depends on the voltage.

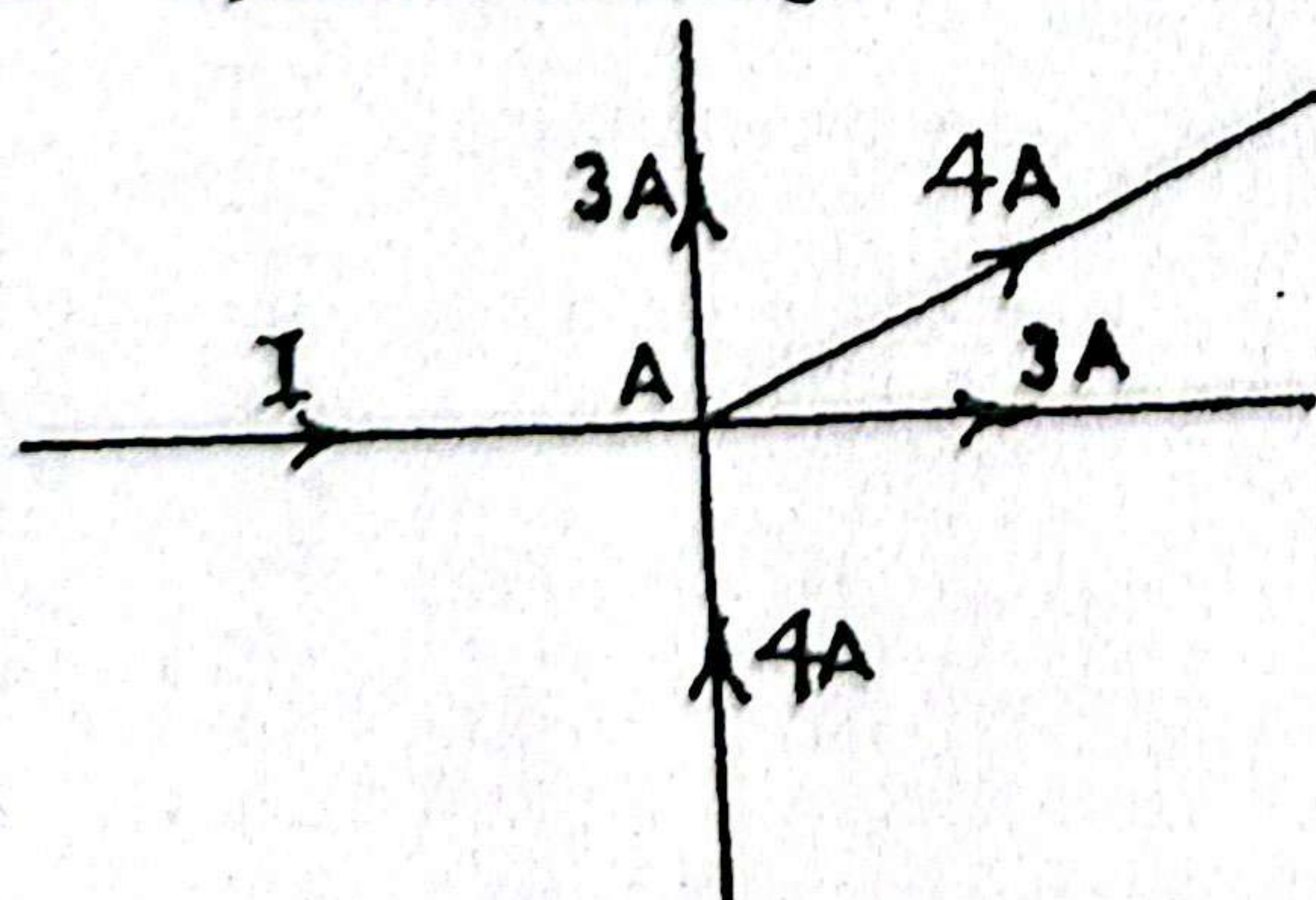


Figure 1

3. The value of I in Figure 1 is

- A. 14 A.
- B. 10 A.
- C. 7 A.
- D. 6 A.

4. An electric kettle connected to a 240 V mains supply draws a current of 10 A. The electrical energy consumed in 20 seconds is

- A. 480 J.
- B. 2,400 J.
- C. 4,800 J.
- D. 48,000 J.

5. What is the electrical equivalent of reluctance?

- A. Current
- B. Power
- C. Resistance
- D. Conductance

6. Which of the following devices is an electromagnetic device?
- Electric bulb
 - Electric bell
 - Electric cooker
 - Electric toaster
7. The unit of reluctance is
- At .
 - Wbm^{-2} .
 - Atm^{-1} .
 - $AtWb^{-1}$.
8. Which of these properties is true of a magnet?
- Like poles of a magnet attract
 - Unlike poles of a magnet repel
 - The power of a magnet is concentrated at the poles
 - Magnetic properties are derived from iron ore
9. Which of the following statements is correct about capacitors connected in series circuit?
- The voltages are the same
 - The charges are the same
 - The current is the same
 - The power is the same
10. The energy stored in a charged capacitor of capacitance $50\mu F$ at a voltage of $100 V$ is
- $0.0025 J$.
 - $0.005 J$.
 - $0.25 J$.
 - $0.5 J$.
11. A conductor carries a current of $400 A$ at right angle to a magnetic field. If the flux density is $0.5 T$, the force on $1 m$ on the conductor is
- $20 N$.
 - $80 N$.
 - $200 N$.
 - $800 N$.
12. An instrument used for measuring power dissipated in a circuit is known as
- ammeter.
 - ohmmeter.
 - voltmeter.
 - wattmeter.
13. Which of the following statements is true about voltmeter and ammeter connections in a circuit?
- Voltmeters are placed in series and ammeters are placed in parallel
 - Ammeters are placed in series and voltmeters are placed in parallel
 - Both ammeters and voltmeters are placed in series
 - Both ammeters and voltmeters are placed in parallel.
14. A coil of 2000 turns carries current of $0.5 A$ and produces a flux of $20 \times 10^{-6} Wb$. The inductance of the coil is
- $0.8 H$.
 - $0.2 H$.
 - $0.08 H$.
 - $0.02 H$.
15. An OR logic gate has
- one input and one output.
 - one input and two outputs.
 - two or more inputs and one output.
 - two or more inputs and more outputs.

16. The decimal equivalent of 1101_2 is

- A. 13.
- B. 12.
- C. 11.
- D. 10.

17. In a purely resistive circuit, the phase angle between voltage and current is

- A. 0° .
- B. 45° .
- C. 60° .
- D. 90° .

18. In a reactive circuit, the impedance is dependent on

- A. current.
- B. frequency.
- C. power.
- D. voltage.

19. The peak factor of an alternating current wave shape is defined as the ratio of its

- A. *rms* value to its maximum value.
- B. *rms* value to its average value.
- C. maximum value to its *rms* value.
- D. average value to its *rms* value.

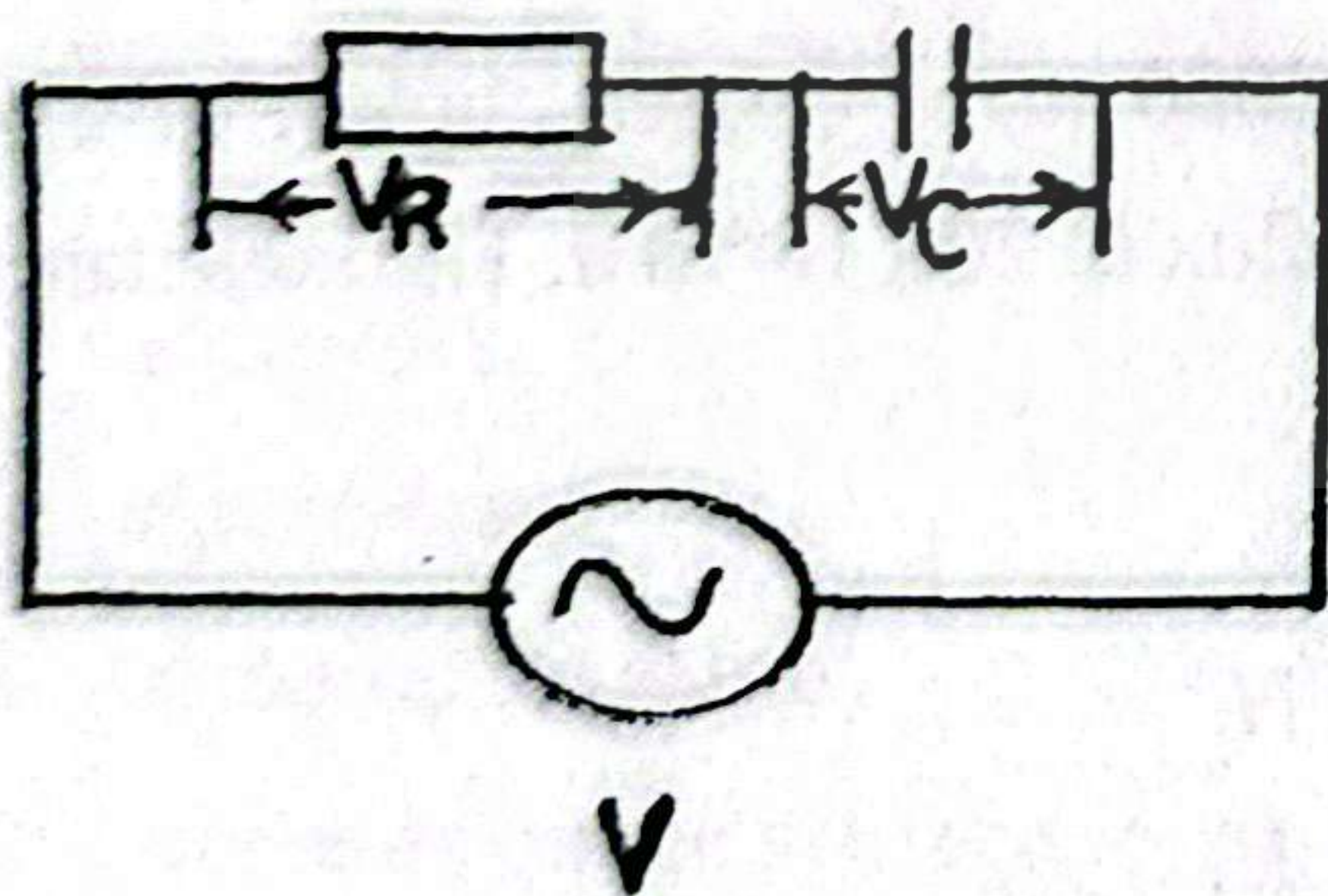


Figure 2

20. In Figure 2, the potential drop across the capacitor is given as

- A. $V_C = V_R + V$.
- B. $V_C = V - V_R$.
- C. $V_C = \sqrt{V^2 - V_R^2}$.
- D. $V_C = \sqrt{V_R^2 + V^2}$.

4

21. The true power of a load connected to a 230 V and a lagging current of 7 A at 60° is

- A. 805 W.
- B. 1394 W.
- C. 1610 W.
- D. 2789 W.

22. The inductive reactance of a coil of 5 H at 50 Hz frequency is

- A. $\frac{1}{500\pi} \Omega$
- B. $\frac{1}{250\pi} \Omega$
- C. $250\pi \Omega$.
- D. $500\pi \Omega$.

23. Which of the following losses remain constant during normal operation of a transformer?

- A. Copper loss
- B. Core loss
- C. Stray loss
- D. Dielectric loss

24. Self induction is the principle for the operation of

- A. motors.
- B. auto-transformers.
- C. generators.
- D. centre-tap transformers.

25. The purpose of laminating a transformer core is to reduce

- A. mechanical losses.
- B. hysteresis losses.
- C. eddy current losses.
- D. copper losses.

26. A 200 kVA, 400 V/200 V, 50 Hz transformer has a primary current of

- A. 0.2 A.
- B. 0.5 A.
- C. 200 A.
- D. 500 A.

27. In relation to a transformer, the ratio 10:1 indicates that

- A. there are 10 turns on the secondary and one turn on the primary.
- B. primary voltage is $\frac{1}{10th}$ of the secondary.
- C. primary current is 10 times greater than the secondary current.
- D. for every 10 turns on the primary, there is one turn on secondary.

28. The terminal voltage of alkaline cell is

- A. 1.25 V.
- B. 1.50 V.
- C. 2.00 V.
- D. 3.60 V.

29. The main purpose of a regulator in a *d.c* power supply unit is to compensate for

- A. transformer losses.
- B. inefficient rectifier.
- C. load variation.
- D. frequency variation.

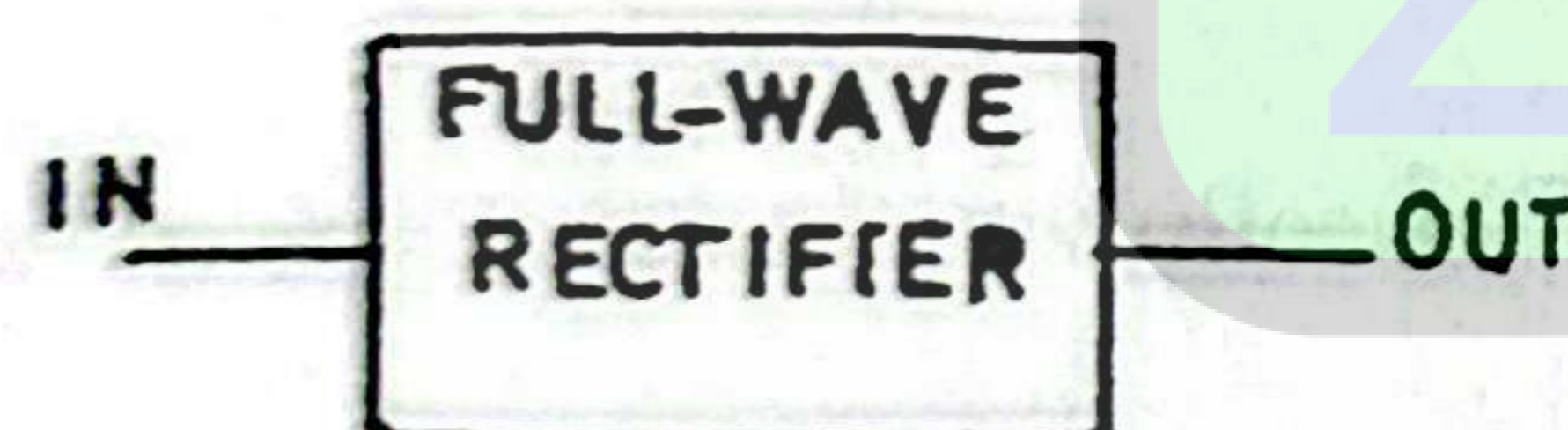
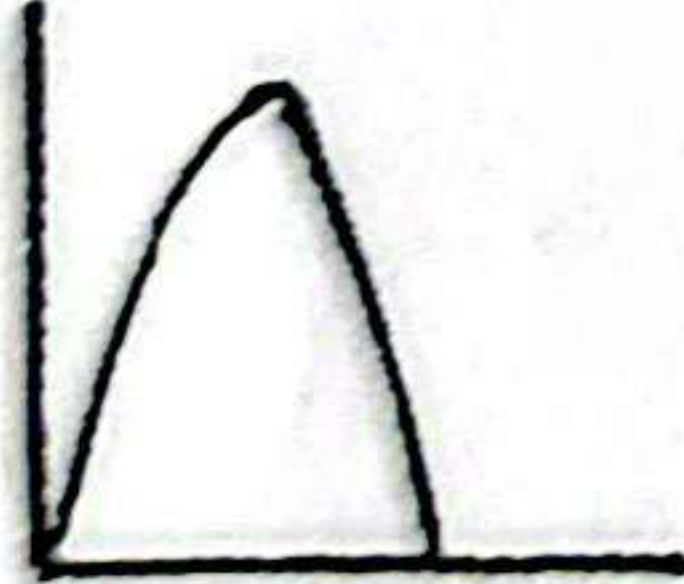
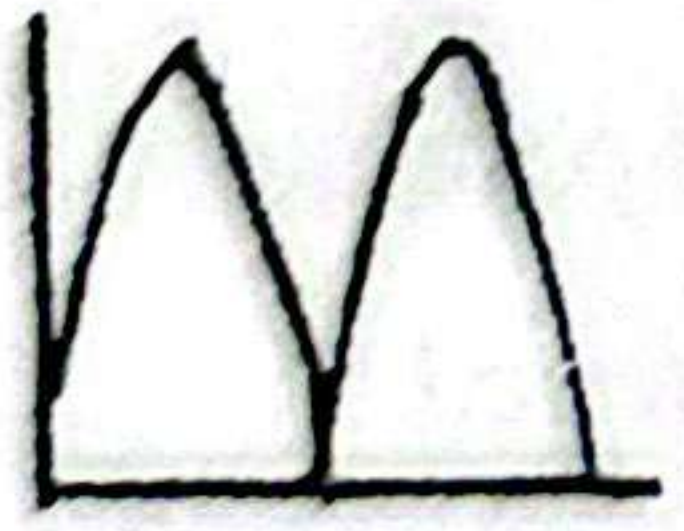
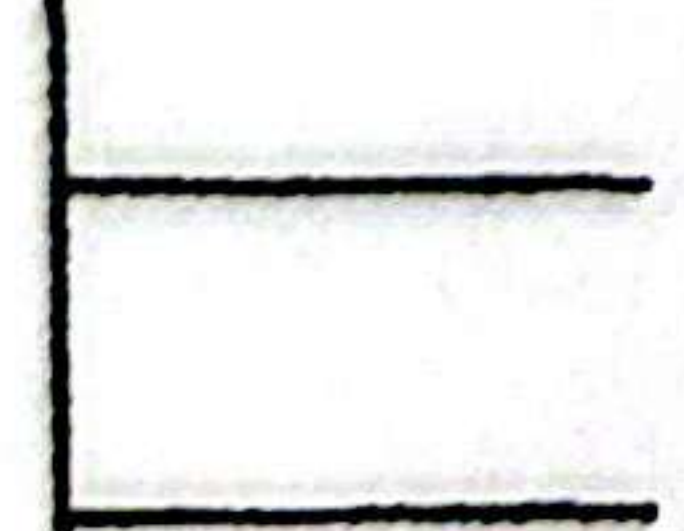
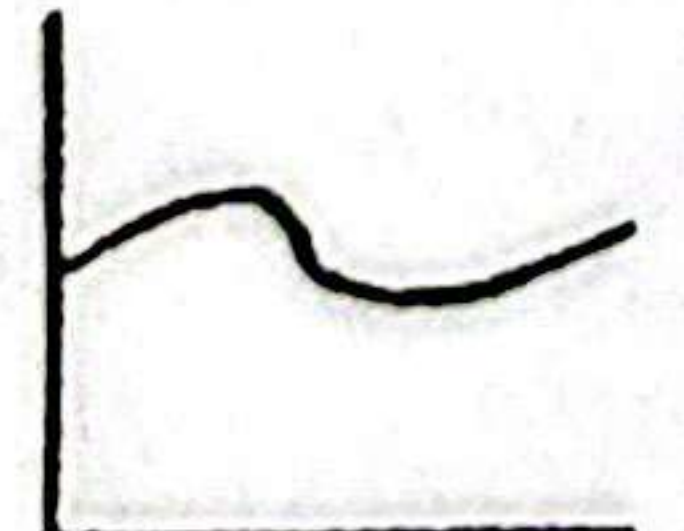


Figure 3

30. If the input in Figure 3 is a sinusoidal wave, the output is

- A. 
- B. 
- C. 
- D. 

31. When a signal from a step-down transformer is rectified and filtered, the resulting *d.c* signal has a voltage that is

- A. higher than the *r.m.s* voltage of the transformer output.
- B. much lower than the *r.m.s* voltage of the transformer output.
- C. the square of the voltage of the transformer output.
- D. lower than $\sqrt{2}$ of the transformer output.

32. The single-phase induction motor is **not** self-starting because it has

- A. a rotating magnetic field.
- B. a good starting torque.
- C. a pulsating torque.
- D. no starting winding.

33. The part of an alternator that transfers alternating current to an external circuit is

- A. brushes.
- B. slip-rings.
- C. stator core.
- D. rotor.

34. The starting winding of a single phase motor is placed in the

- A. stator.
- B. rotor.
- C. armature.
- D. field.

35. Which of the following motors is suitable for electric fans?

- A. Series motor
- B. Shunt motor
- C. Capacitor-start motor
- D. Split phase motor

36. Which of the following is **not** true of a single-phase synchronous motor?
- It is used in electric clocks
 - It operates at a leading power factor
 - The speed is governed by the frequency of the main supply
 - The field winding is on the stator winding
37. The speed in *r.p.m* of a four-pole *a.c* motor running at a frequency of 50 Hz is
- 200.
 - 750.
 - 1500.
 - 3000.
38. A 2-pole *a.c* motor runs at a speed of 1500 *r.p.m*. The frequency is
- 25 Hz.
 - 30 Hz.
 - 50 Hz.
 - 60 Hz.
39. Which of the following equations represents the terminal voltage of a generator?
- $V = E - I_a R_a$
 - $V = E + I_a R_a$
 - $V = E - I_a R_a$
 - $V = I_a R_a$
40. A direct-on-line starter of motor is used
- to step up the input voltage.
 - to step up the starting current.
 - to limit a high starting current.
 - for low voltage motor only.
41. In a three-phase low voltage supply, the standard phase voltage is
- 220 V.
 - 240 V.
 - 415 V.
 - 500 V.
42. The process of supplying electrical power from a local substation to consumers is by means of
- transmission.
 - generation.
 - installation.
 - distribution.
43. One tool used to draw wires into a conduit pipe is
- bending spring.
 - fishing tape.
 - stock and die.
 - gimlet.
44. Which of the following is **not** a type of fuse?
- Rewireable fuse
 - Cartridge fuse
 - Current fuse
 - High breaking capacity fuse
45. Where copper is used as an earth continuity conductor, its resistance value must not exceed
- 0.5 Ω .
 - 1.0 Ω .
 - 0.5 M Ω .
 - 1.0 M Ω .

46. The following instruments are used for polarity test except

- A. multimeter.
- B. test lamp.
- C. megger.
- D. low reading ohmmeter.

47. Fire risk in electrical circuit cannot be caused by

- A. faulty socket outlet.
- B. aging appliance.
- C. underloading light fixtures.
- D. extension and misuse.

48. In a 3-phase 4-wire system of electricity supply, a consumer on a single phase receives power from

- A. any two phases.
- B. a phase and earth.
- C. a phase and the neutral.
- D. the neutral phase and earth.

49. The condition of the lamps when the switches are both in point A is

- A. lamp 1 - OFF, lamp 2 - ON.
- B. lamp 1 - ON, lamp 2 - OFF.
- C. both lamps are ON.
- D. both lamps are OFF.

50. What is the condition of the lamps when switch 1 is at A and switch 2 is at B?

- A. Lamp 1 - OFF, lamp 2 - ON
- B. Lamp 1 - ON, lamp 2 - OFF
- C. Both lamps are ON
- D. Both lamps are OFF

END OF PAPER

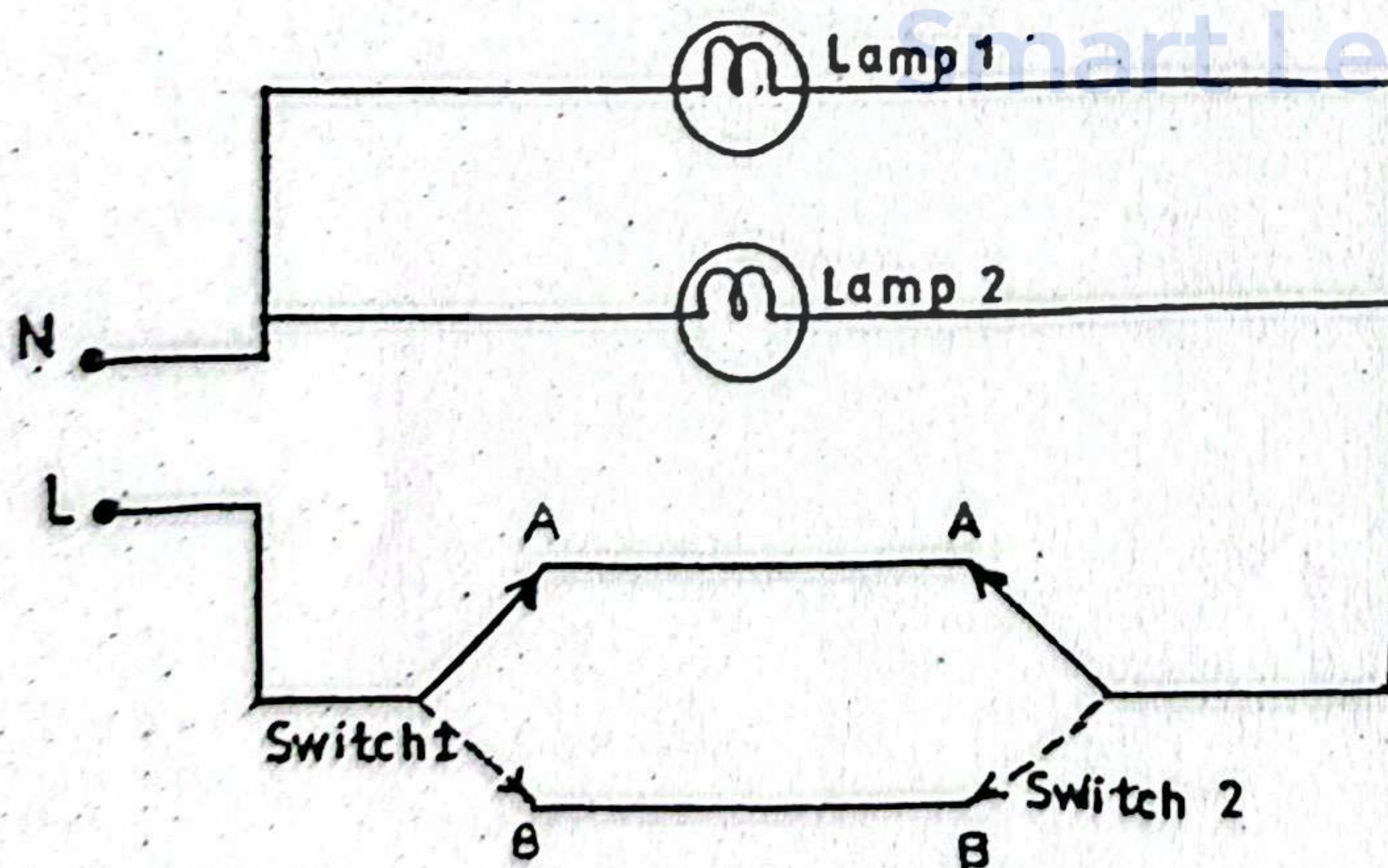


Figure 4

Figure 4 is a lighting circuit. Use it to answer questions 49 and 50.