



**RADIO ELECTRONICS AND TELEVISION SERVICEMAN  
CERTIFICATE**

**FINAL EXAMINATION PENSTER 1-2016**

**EEE201 BASIC ELECTRONICS**

**DATE: 17<sup>th</sup> March ,2016. TIME - 9.00 –11.10 am**

**INSTRUCTIONS TO STUDENTS**

1. You are allowed 10 minutes EXTRA time during which you are not to write.
2. Write your candidate number on the top of each sheet of the answer booklet.
3. Write all your answers in the ANSWER BOOKLET provided.
4. For all sheet of papers on which rough/draft work has been done, cross it through and attach these to your answer script.
5. Attempt ALL questions worth a total of 135 MARKS for 2 HOURS

**SECTION A – Fill the blank with the correct word or number ?.**

**20 MARKS**

NOTE: (Select your answer from the list of terms on the last row)

1	Materials on which electric current flows easily are called _____.
2	The unit given to express the amount of current flow in a part of electrical circuit is the _____.
3	The unit given to express the amount of voltage across the terminal of a voltage source is the _____.
4	The unit given to express the value of a resistor is called the _____.
5	The core of an atom is called _____ and consists of proton and neutron
6	_____ are the part of an atom which orbit around the core
7	The materials which opposes the flow of electrons to a much much greater degree than conductors are called _____.
8	The _____ is an electronic component which is made up of two plates and a dielectric
9	Like charges _____ and unlike charges _____.
10	The electronic component which is called the _____ allows current to flow in one direction only
11	The purpose of a transformer which is used in a mobile phone charger is to _____ the 240 volts .
12	The function of an oscillator is to generate _____ voltages at certain frequency
13	The frequency of the voltage at any FEA power point in all homes is _____.
14	The _____ dissipated by a resistor can be determined by the product of voltage and current
15	Ohms law is only true if the _____ is constant.
16	A necessary condition of current to flow in an electrical circuit is for it to _____.
17	The current cannot flow in an electrical circuit that has an _____ circuit
18	In order for a power supply to deliver voltage without ripple a _____ has to be used.
19	In order for a power supply to deliver constant voltage the _____ has to be used.
	Attract, Temperature, Reduce, Diode, Ampere, Filter, Conductors, Insulators, Volt, nucleus, Electrons, Ohm, capacitor, AC voltages, 50 Hz, Power, Complete, Open, Repel, Regulator
	<b>20 marks</b>

**SECTION B****(True or False)****(15 MARKS)**

*In your answer sheet write the question number and the answer beside it . If the statement is true write the letter T and if its false the letter F?*

1. One diode can be used as a half wave rectifier.
2. Digits used in binary number systems are 1 and 0.
3. There are two different materials used on the bipolar junction transistor.
4. Testing the transistor to determine if it is good or bad can be done by physically checking the continuity between leads
5. The forward biased barrier potential for germanium diode is approximately 0.3V.
6. For the two input AND gate, the output will be LOW only when both inputs are HIGH.
7. The mathematical expression used to describe 2 input AND gate is  $A + B = X$ .
8. To measure voltage drop across a resistor, the voltmeter has to be placed in parallel with the resistor.
9. The binary number for decimal number: 37 is 100101
10. The decimal number for the binary number 1100110 is 112
11. For the binary number 10110 is equivalent to 25 in decimal.
12. Atoms are comprised of electrons, protons and neutrons.
13. Electrons are found orbiting the nucleus of an atom at specific intervals based on their energy levels.
14. The outermost orbit of electrons are called valence orbit
15. The region beyond the valence band is called the conduction band.
16. Electrons in the conduction band are very difficult to be made to be free electrons
17. A wire is a good conductor but it is not perfect because it has some resistance to the flow of current.
18. Gold, copper and silver a good insulator of electricity
19. Thick wire of the same material present lower resistance than the thin wire.
20. Every resistor has a power rating which is to a large degree, determine by its size.

**SECTION C****(Multiple choice)****30 MARKS**

Read the questions properly and write the letter representing the best answer on the answer script provided.

1. In colour coded resistors, a silver 4th band indicates:
  - a) 5% Tolerance
  - b) 10% Tolerance
  - c) 0% Tolerance
  - d) 25% Tolerance
  
2. One precaution to observe when checking resistors with an ohmmeter is to
  - a) check high resistance on the lowest ohms range
  - b) check low resistance on the highest ohms range
  - c) disconnect all parallel paths
  - d) make sure your fingers are touching each test lead
  
3. When two resistors are connected in parallel
  - a) they must both have the same resistance
  - b) the voltage across each must be same
  - c) they must have different resistance value
  - d) here is only one path for the current through both resistors.
  
4. With a  $6\text{K}\Omega$  resistance in series with a  $2\text{K}\Omega$ , the total resistance  $R_T$  equals
  - a)  $2\text{K}\Omega$
  - b)  $8\text{K}\Omega$
  - c)  $10\text{K}\Omega$
  - d)  $12\text{K}\Omega$
  
5. To connect a current meter in series.
  - a) open the circuit at one point and use the meter to complete the circuit
  - b) the circuit at the positive and negative terminals of the voltage source.
  - c) short circuit the resistance to be checked and connect the meter across it.
  - d) open the circuit at one point and connect the meter to one end.
  
6. During the negative half cycle, the current in a bridge rectifier flows through
  - a) one diode
  - b) two diodes
  - c) three diodes
  - d) four diodes

7. A Capacitor consist of two

- a) Conductors separated by an Insulator
- b) Insulators separated by a Conductor
- c) Conductors alone
- d) Insulators alone

8. A  $250\mu\text{H}$  inductor is in series with a  $50\ \Omega$  resistor. The time constant is

- a)  $5\mu\text{S}$
- b)  $25\mu\text{S}$
- c)  $50\mu\text{S}$
- d)  $250\text{mS}$

9. A Potentiometer is a.....?

- a) Two terminal device used to vary the current in the circuit
- b) Three terminal device used to vary the voltage in a circuit
- c) Fixed resistor
- d) Two terminal device used for separating the current

10. What is the ripple frequency for the Centre-tapped Full wave Rectifier?

- a)  $f$
- b)  $2f$
- c)  $3f$
- d)  $4f$

11. What is the positive charge in the electronic engineering?

- a) protons
- b) neutrons
- c) electrons
- d) nucleus

12. A capacitances of a capacitor are measured in ?

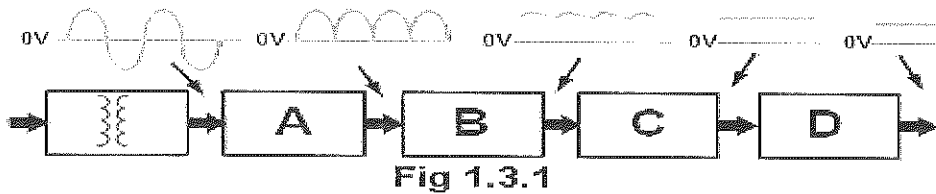
- a) farads
- b) ohms
- c) henrys
- d) pico

13. Three states in which matter exists are:

- a) Solid, Air and Rubber
- b) Solid, Liquid and Rubber
- c) Solid , Air and Gas
- d) Solid, Liquid and Gas

14. In a parallel capacitive circuit of  $47\mu\text{F}$ ,  $10\mu\text{F}$  and  $22\mu\text{F}$  with 12v battery, the total capacitance of the circuit is?
- $12\mu\text{F}$ .
  - $47\mu\text{F}$ .
  - $79\mu\text{F}$ .
  - $22\mu\text{F}$ .
15. In a simple circuit consisting of resistance 100k and capacitance of 100micro, find out the time constant of the circuit ?
- 100 sec
  - 100 min
  - 10 min
  - 10 sec
16. In Question 14 above, calculate the frequency of the circuit?
- 0.1 Hz
  - 100 Hz
  - 10 Hz
  - 0.01 Hz
17. Applying the negative terminal of a voltage source to the n-layer of a diode and the positive terminal to the p-layer results in
- a reverse-biased junction
  - a recombination of majority carriers
  - a large current flow
  - an increased barrier region.
18. In the schematic symbol for a transistor, the line with the arrowhead represents the
- cathode
  - collector
  - base
  - emitter
19. In the schematic symbol for a p-n junction diode, the arrowhead part of the symbol represents
- collector
  - base
  - anode
  - cathode
20. The units of capacitance can be
- in microfarad
  - picofarad
  - nanofarad
  - all of the above

21. Refer to Fig. 1.3.1. What is the function of block B?



- a) rectifier
- b) reservoir capacitor
- c) low pass filter
- d) regulator

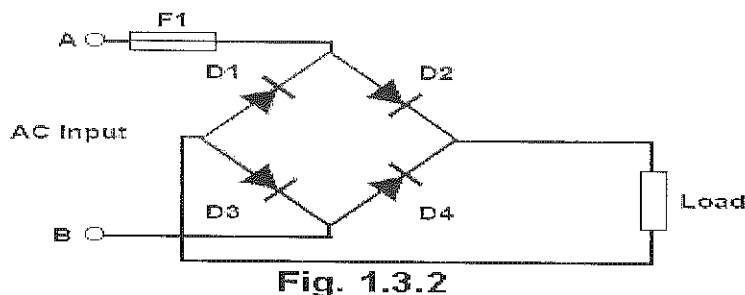
22. Refer to Fig 1.3.1. What is the function of block A ?

- a) Transformer
- b) Full wave rectifier
- c) Bridge rectifier
- d) Reservoir capacitor

23. Refer to Fig 1.3.1. What will be the approximate value of the DC component of the waveform at the output of block A?

- a)  $V_{PK} \times 0.318$
- b)  $V_{PK} \times 0.5$
- c)  $V_{PK} \times 0.637$
- d)  $V_{PK} \times 0.707$

24. Refer to Fig 1.3.2. If input B is more positive than input A, which diodes will be conducting?



- a) D1 and D2
- b) D2 and D3
- c) D1 and D4
- d) D3 and D4

25. Refer to Fig 1.3.2. If D4 were to go short circuit, what would be the effect on the operation of the circuit?

- a) A decrease in the current through D1.
- b) Fuse F1 would blow.
- c) A higher voltage across the load.
- d) A larger peak current through D2 and D3.

26. What is the action of the reservoir capacitor in a basic power supply circuit?

- a) To de-couple the DC component of the rectifier AC output
- b) To increase the DC component and reduce the AC component of the AC wave.
- c) To remove the DC component of the AC wave.
- d) To regulate the AC wave.

27. Which of the following is an advantage of using a LC low pass filter rather than a RC low pass filter in a power supply?

- a) The reactance of L will be much lower than the resistance of R at mains frequency.
- b) The reactance of L will be much higher than the resistance of R at mains frequency.
- c) An inductor can dissipate more power than a resistor.
- d) LC filters are less expensive than RC filters.

28. Refer to Fig 1.3.3. What is the power dissipated in R1?

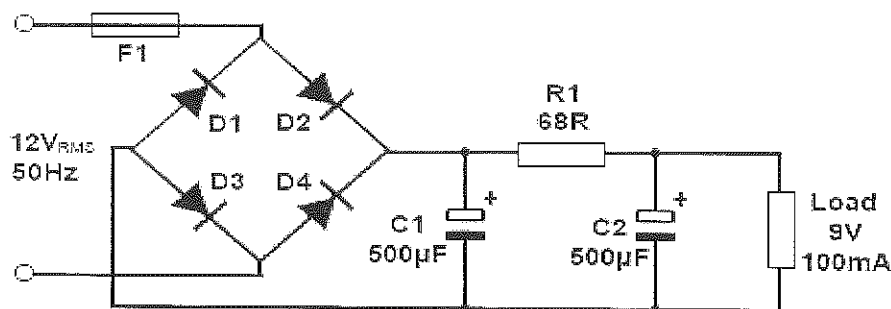


Fig. 1.3.3

- a) 5 W
- b) 1 W
- c) 0.5 W
- d) 0.25 W



29. Refer to Fig 1.3.3. What will be the approximate value of DC across C1?

- a) 3.8 V
- b) 7.6 V
- c) 10.8 V
- d) 14.5 V

30. Refer to Fig 1.3.3. What is the reactance of C2 at the ripple frequency?

- a)  $6.4 \Omega$
- b)  $0.3 \Omega$
- c)  $5.1 \Omega$
- d)  $3.2 \Omega$

**SECTION D**

**Short Answers**

**(30 Marks)**

1. What is the colour coding for a 4 band resistor, which has a value of

(4 marks)

- i)  $12K \Omega \pm 10\%$
- ii)  $4.7K\Omega \pm 5\%$  ?

2. What is the value of a 4 band resistor, which has a colour coding of

(4 marks)

- i) Grey, Blue, Orange, Gold
- ii) Blue, Yellow, Red, Silver ?

3. i) Find the current delivered by a 100V supply to an  $250\Omega$  resistor ?

(2 marks)

ii) Calculate the resistance of an electrical heater if it is connected to a 240V supply causing a current of 6mA to flow ?

(2 marks)

4. State 4 basic or universal gates ?

(4 marks)

5. Draw the 4 type of gates mentioned above ?

(4 marks)

6. Sketch the symbol for the following components

- a. Diode
- b. Transistor (PNP )
- c. NPN JFET
- d. L.E.D (Light Emitting Diode) ?

(3 marks)

7. Shown below in **figure 1** is the logic switch representation.

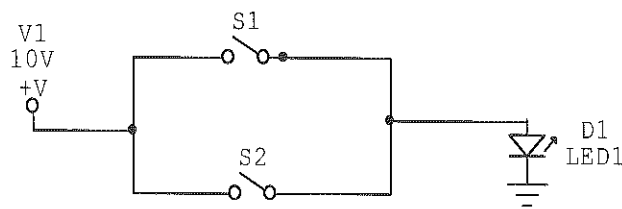


Figure 1.

a) Draw the truth table showing the possibilities of LED 1 to light when S<sub>1</sub> and S<sub>2</sub> are switched on and off.?

(4marks)

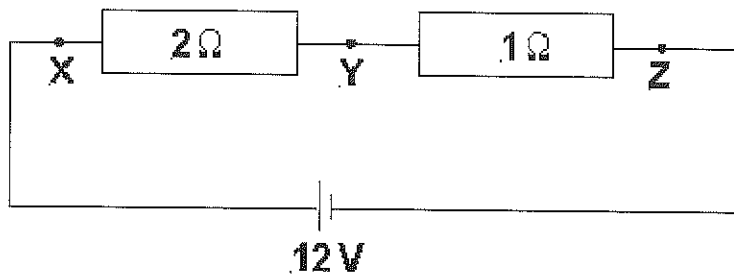
b) Draw the equivalent logic circuit for the above circuit by using logic gates.?

(3 marks)

**SECTION E**

**30 MARKS**

1.. Consider the following circuit and then answer the questions below.

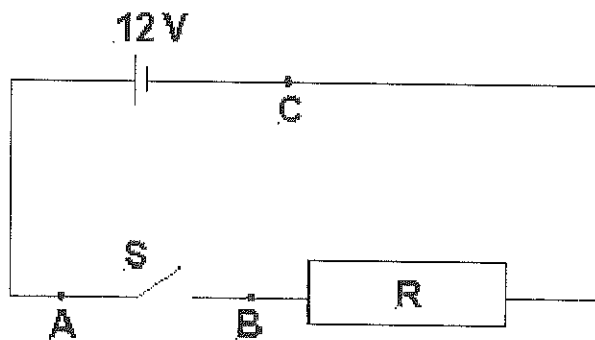


a. State the potential difference between X and Z. ? -

(4 marks)

- b. State the potential difference between X and Y ?. (3 marks)
- c. How much potential is left at Y? (3 marks)

2. The circuit below shows a resistor, R, connected in series to a 12 V battery across an open switch, S.



- a. If  $R = 6\ \Omega$  how much current flows in the circuit with the switch open? (3 marks)
- b. While the switch remains open, determine the potential difference between:
- A and B ? (2 marks)
  - A and C ? (2 marks)
  - B and C ? (2 marks)
- c. When the switch is closed and  $R = 6\ \Omega$ , determine:
- the current in the circuit; ? (3 marks)
  - the potential difference between A and B; and (2 marks)
  - the potential difference between B and C. ? (1 marks)
- d. Draw clearly a circuit diagram of a full wave rectifier showing the input and output waveform ? (5 marks)

**SECTION F – Match each term on the RHS to its meaning in the LHS. Write down on your answer sheet the number of the question and beside it the letter representing the correct answer.**

**10 MARKS**

	LHS	ANS	RHS	
1	Ammeter		Measures the degree to which a material opposes the flow of electrons	a.
2	Voltmeter		The versatile measuring equipment which can display the waveform in a circuit	b.
3	Voltage		Instrument to measure the resistance	c.
4	Watts		Rate at which a charge flows through a conductor	d.
5	Zener diode		The instrument to measure the voltage level	e.
6	Flip flop		Resistor transistor logic	f.
7	Current		A logic circuit used as a memory element	g.
8	Ohmmeter		Unit of power	h.
9	Oscilloscope		Instrument to measure the current flow	i.
10	Resistance		Forces on electrons that causes them to move	j.
			Different from the normal diode in that it permits current in the reverse direction if the voltage is larger than the breakdown voltage	k.

THE END

**EQP RECEIPT CHECKLIST FORM**

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