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Reg. No.

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I Semester B.Sc. Degree Examination, August - 2021

ELECTRONICS

Basic Electronics

(CBCS Scheme - Freshers 2020-21 Onwards)

Paper : I (EL - 101T)



Time : 3 Hours

Maximum Marks : 70

**Instructions to Candidates :**

Answer ALL questions from Part - A, any FIVE questions from Part - B and any FOUR questions from Part - C.

**Note:** Answer all the questions of Part A in any one page, the same question answered multiple times will not be evaluated.

**PART - A**

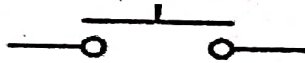
Answer all the sub divisions.

(15×1=15)

1. i) Internal resistance of an ideal voltage source is

- a) Zero      b) Infinity      c)  $0.5M\Omega$       d) High

ii) The following circuit symbol represents



- a) An SPDT switch      b) A DPDT switch  
c) A Push to ON switch      d) A Push to OFF switch

iii) The circuit whose properties are same in either direction is known as

- a) Unilateral circuit      b) Bilateral circuit  
c) Irreversible circuit      d) Reversible circuit

iv) Thevenin's equivalent circuit consists of

- a) A constant voltage source with a resistance in parallel  
b) A constant voltage source with a resistance series  
c) A current source with a resistance in parallel  
d) A current source in series with a resistance

v) According to KVL, the algebraic sum of all IR drops and EMFs in any closed loop of a network is always

- a) Zero      b) Positive  
c) Negative      d) Equal to unity

[P.T.O.]



- vi) In voltage regulator circuits, Zener diode is operated in \_\_\_\_\_  
a) Forward bias mode                      b) Forward breakdown region  
c) Reverse breakdown region              d) None of the above
- vii) Third approximation of a diode is represented by  
a) Only a dc source                      b) An ideal diode and dc source  
c) Only a series resistance              d) A dc source with ideal diode and a resistance
- viii) Theoretical value of ripple factor for half Wave Rectifier is  
a) 0.482                      b) 0.812  
c) 1.11                      d) 1.21
- ix) Transistor acts as a switch in  
a) Cut off and saturation regions      b) Cut off and active regions  
c) Saturation and active regions      d) In all the three regions
- x) In a Bipolar Junction Transistor,  
a) Emitter is moderate in size and heavily doped.  
b) Emitter is larger in size and heavily doped.  
c) Emitter is smaller in size and heavily doped.  
d) Emitter is smaller in size and lightly doped.
- xi) In an NPN transistor operating in the active region, most of the electrons from the emitter  
a) Recombine with the holes in the base.  
b) Recombine in the emitter itself  
c) Pass through the base to the collector  
d) Are stopped by the junction barrier.
- xii) Transistor acts as a switch in  
a) Cut off and saturation regions      b) Cut off and active regions  
c) Saturation and active regions      d) Active region only
- xiii) The principle characteristic feature of Gray code is  
a) It changes by only one bit between two consecutive numbers  
b) It has more number of ones  
c) It has more number of zeros  
d) It changes by two bits between two consecutive numbers
- xiv) 4 bit representation in Sign magnitude convention for negative number, -6 is  
a) 0111                      b) 1110  
c) 1111                      d) 1010



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xv) Invalid numbers in BCD are

- a) 1001, 1000, 0111, 0000, 0010 and 0011
- b) 0001, 0010, 0111, 0110, 0010 and 0011
- c) 1010, 1011, 1100, 1101, 1110 and 1111
- d) 1000, 1001, 0111, 0010, 0011 and 0111.

**PART - B**

Answer any FIVE questions.

(5×7=35)

2. a) Explain the method of conversion of a voltage source into a current source.  
b) Explain with a circuit, growth of charge in a series RC circuit. Show it graphically and define 'time constant'. (2+5)
3. a) What is resonance? Draw the circuit diagram of a parallel resonance circuit and show its response graphically. Write the condition for resonance and expressions for  
i) Resonance frequency      ii) Q- factor      &iii) Bandwidth
4. a) State Superposition Theorem.  
b) State Thevenin's theorem. With suitable circuit diagrams, explain the steps to Thevenise a resistive network. (2+5)
5. Draw and explain the working of bridge rectifier. Also draw the input and output wave forms. Mention its advantages and disadvantages.
6. a) With a circuit diagram, explain the operation of a Shunt capacitor filter.  
b) Draw the circuit of a transistor voltage regulator. (5+2)
7. a) Explain the terms DC load line and Q point with respect to a transistor.  
b) Obtain the dc analysis of voltage divider bias. (2+5)
8. With necessary diagrams, explain the working of a JFET and define the parameters  $r_d$ ,  $g_m$  and  $\mu$ .
9. a) Explain with example, method to convert a decimal number into its hexadecimal Equivalent. Consider the Integer and fractional parts of decimal number.  
b) Explain self - complementing property of Excess 3 code with an example. (4+3)

[P.T.O.]



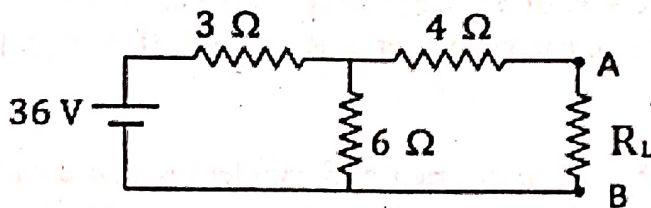


## PART - C

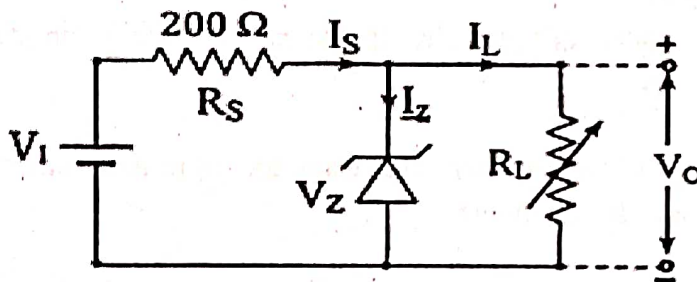
Answer any FOUR questions.

(4×5=20)

10. A series resonance circuit has a capacitor of  $100\mu\text{F}$ , an inductor of  $100\mu\text{H}$  and a resistor of  $5\Omega$ . Calculate
- Resonant frequency
  - Band width when Q factor is 200.
11. Determine value of  $R_L$  for Maximum power transfer in the following circuit. Also calculate the Maximum power delivered to the load.



12. Calculate  $R_{L(\min)}$  and  $R_{L(\max)}$  in the circuit shown for getting regulated output voltage.
- Given:  $V_Z = 10\text{V}$ ,  $V_I = 20\text{V}$  and  $I_{Z(\max)} = 40\text{mA}$ .



13. Following observations have been recorded in an experiment to plot the characteristics of an NPN transistor in CE mode. Determine  $r_i$ ,  $r_o$  and the current amplification factor  $\beta_{ac}$ .

$V_{BE}$ (volt)	$I_B$ ( $\mu\text{A}$ )	$V_{CE}$ (volt)	$I_C$ (mA)
0.66	50	6	5
0.71	100	6	10
0.71	100	11	10.5

14. Perform the Subtraction of following binary numbers using 2's complement method. Express the results in decimal system.
- $11100_{(2)} - 10011_{(2)}$
  - $1001_{(2)} - 1100_{(2)}$ .
- (2+3)
15. a) Add  $D9_{(16)}$  with  $A2_{(16)}$ . Express the result in decimal.
- b) Convert the following binary number into Hexadecimal  $110101001.100111_{(2)}$ .
- (3+2)