

I Semester B.Sc. Examination, November/December 2017  
(CBCS) (2014 – 15 and Onwards) (F+R)  
**ELECTRONICS – I**  
**Basic Electronics**



Time : 3 Hours

Max. Marks : 70

**Note :** 1) Answer **all** questions from Part – A, **any five** from Part – B and **any four** questions from Part – C.

2) Answer **all** questions from Part – A in **any one** page, the same question answered multiple times will **not** be considered for evaluation.

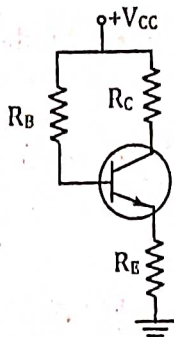
**PART – A**Answer **all** the sub divisions.**(15×1=15)**

1. i) We need a resistor of value  $47\text{ K}\Omega$  with  $\pm 5\%$  tolerance. The sequence of the color band on this resistor should be
  - a) yellow, violet, yellow and gold
  - b) yellow, violet, orange and gold
  - c) yellow, violet, orange and silver
  - d) yellow, violet, brown and gold
- ii) In a step up transformer, the number of turns in the secondary coil is
  - a) Less than primary coil turns
  - b) More than primary coil turns
  - c) Equal to primary coil turns
  - d) None of the above
- iii) Thevenin's equivalent circuit consists of a
  - a) constant voltage source with a resistance in parallel
  - b) constant voltage source with a resistance in series
  - c) a current source with an voltage source
  - d) current source in series with a resistance
- iv) According to Kirchhoff's current law, the algebraic sum of the currents meeting at a point is always
  - a) zero
  - b) positive
  - c) negative
  - d) equal to unity
- v) In order to obtain a maximum power from the terminals of a network, the load resistance should be
  - a) greater than the circuit resistance
  - b) equal to the circuit resistance
  - c) less than the circuit resistance
  - d) double the circuit resistance

P.T.O.



- vi) Current flows through a Germanium practical diode when the forward bias applied to it exceeds
- a) 0.3 v
  - b) 1 v
  - c) 0.7 v
  - d) 0 volt
- vii) Third approximation of a diode is represented by
- a) only a dc source
  - b) dc source with a series resistance
  - c) dc source with a series resistance and an ideal diode
  - d) a dc source parallel with a resistance
- viii) Theoretical value of ripple factor for a Center Tap Full Wave Rectifier is
- a) 0.482
  - b) 0.812
  - c) 1.11
  - d) 1.21
- ix) 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
- x) 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
- xi)



The circuit shown above is

- a) Fixed bias
  - b) Fixed bias with emitter feedback
  - c) Collector to base bias
  - d) Voltage divider bias
- xii) In an N Channel Field-Effect Transistor (FET), the gate is
- a) a P type semiconductor
  - b) a N type semiconductor
  - c) both a and b
  - d) none of the above
- xiii) The code used in digital systems to represent decimal digits, alphabets and other special characters such as +, -, \*, etc. is
- a) Hexadecimal
  - b) Octal
  - c) BCD
  - d) ASCII





- xiv) The principal characteristic feature of gray code is
- It changes by only one bit between two consecutive numbers
  - It has more number of ones
  - It has more number of zeros
  - It changes by two bits between two consecutive numbers
- xv) Invalid numbers in BCD are
- 1001, 1000, 0111, 0000, 0010 and 0011
  - 0001, 0010, 0111, 0110, 0010 and 0011
  - 1010, 1011, 1100, 1101, 1110 and 1111
  - 1000, 1001, 0111, 0010, 0011 and 0111

## PART – B

Answer **any five** questions.

(5×7=35)

- Explain the method of conversion of a voltage source into a current source.
  - Draw the circuit diagram of series RC circuit. Write the expressions for charging and discharging of the circuit. Show it graphically. (2+5)
- Draw a series RL circuit excited by an a.c. source. Write the equations for voltage, impedance and phase angle.
  - Draw the circuit symbols for SPDT, DPDT and SPST switches. (4+3)
- State Maximum power transfer theorem.
  - State Norton's theorem. With suitable circuit diagrams, explain the steps to Nortonise a resistive network. (2+5)
- Draw the circuit diagram of full wave bridge rectifier and explain its working. Draw the input and output wave forms. Mention its advantages and disadvantages. 7
- What is a filter ? Draw the circuit diagram of capacitor filter.
  - With the circuit diagram, explain working of Zener diode voltage regulator. (2+5)
- Define  $\alpha$  and  $\beta$  of a transistor.
  - Draw the experimental circuit to study CE characteristics of a transistor. Plot the input and output characteristics graphs and indicate the different regions. (2+5)
- Draw the diagram of voltage divider biasing circuit. Write the expressions for Q point.
  - With necessary diagram, explain the working of JFET. (3+4)
- Explain with numerical example, method to convert a decimal number into its binary equivalent. Consider the integer and fractional parts of decimal number.
  - Write the BCD and Excess 3 code for all the decimal digits. (4+3)



## PART – C

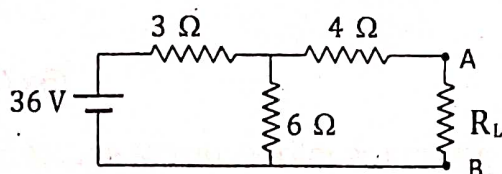
Answer any four questions.

(4×5=20)

10. A series resonance circuit has a capacitor of 100 pF, an inductor of 100  $\mu$  H and a resistor of 5  $\Omega$ . Calculate.

- Resonant frequency
- Band width when Q factor is 200.

11. Using Thevenin's theorem, find the current in  $R_L = 10 \Omega$  in the following circuit. Also write Thevenin's equivalent circuit.



12. Calculate efficiency and PIV of a half wave rectifier circuit with an input voltage of 220 V rms and load  $R_L$  of 100  $\Omega$ . Given  $r_d = 5 \Omega$  and turns ratio of the transformer is 10 : 1.

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)	$I_B$ ( $\mu$ A)	$V_{CE}$ (volt)	$I_C$ (mA)
0.65	50	6	5
0.70	100	6	10
0.70	100	11	10.5

14. Subtract the following numbers using 2's complement method

i)  $(BF)_{16} - (FB)_{16}$

ii)  $(10010)_2 - (1001)_2$

(3+2)

15. a) Convert the following Gray numbers in to equivalent binary numbers.

i) 1001010

ii) 11001100

- b) Express the  $(F5)_{16}$  in binary and decimal number.

(3+2)