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 KΩ with ± 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)
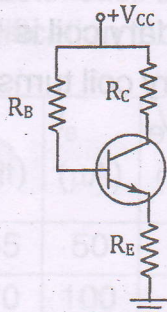
   The circuit shown above is
   a) Fixed bias   b) Fixed bias with emitter feedback
   c) Collector to base bias   d) Voltage divider bias

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
    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

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) Draw the circuit diagram of series RC circuit. Write the expressions for charging and discharging of the circuit. Show it graphically.   **(2+5)**

3. a) Draw a series RL circuit excited by an a.c. source. Write the equations for voltage, impedance and phase angle.

   b) Draw the circuit symbols for SPDT, DPDT and SPST switches.   **(4+3)**

4. a) State Maximum power transfer theorem.

   b) State Norton's theorem. With suitable circuit diagrams, explain the steps to Nortonisea resistive network.   **(2+5)**

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**

6. a) What is a filter ? Draw the circuit diagram of capacitor filter.

   b) With the circuit diagram, explain working of Zener diode voltage regulator.   **(2+5)**

7. a) Define α and β of a transistor.

   b) 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)**

8. a) Draw the diagram of voltage divider biasing circuit. Write the expressions for Q point.

   b) With necessary diagram, explain the working of JFET.   **(3+4)**

9. a) Explain with numerical example, method to convert a decimal number into its binary equivalent. Consider the integer and fractional parts of decimal number.

   b) 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 μH and a resistor of 5Ω. Calculate.
    i) Resonant frequency
    ii) Band width when Q factor is 200.

11. Using Thevenin's theorem, find the current in R_L = 10Ω in the following circuit. Also write Thevenin's equivalent circuit.
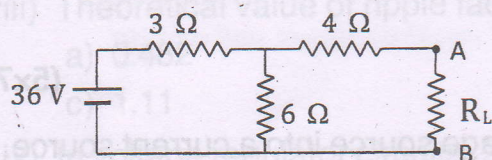
12. Calculate efficiency and PIV of a half wave rectifier circuit with an input voltage of 220 V rms and load R_L of 100Ω. Given r_d = 5Ω and turns ratio of the transformer is 10 : 1.

13. Following observations have been recorded in an experiment to plot the characteristics of an NPN transistor in CE mode. Determine, r_i, r_0 and the current amplification factor β_{ac}.

V_{BE} (volt)	I_B (μA)	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)