QP – 255

I Semester B.Sc. Examination, April/May 2021
(CBCS – F + R – 2014-15 and Onwards)
ELECTRONICS – I
Basic Electronics

Time : 3 Hours

Max. Marks : 70

Instructions : *i) Answer **all** questions from Part – **A**, **any five** questions from Part – **B** and **any four** questions from Part – **C**.*
*ii) Answer **all** questions of Part – **A** in **any one** page, the **same** questions answered multiple times will **not** be considered for evaluation.*

PART – A

1. Answer **all** the sub-divisions : **(1×15=15)**

i) A resistor has colour code bands as Brown, Black, Orange and Gold. Its value is

a) 1 KΩ ± 10%
b) 10 KΩ ± 5%
c) 100 KΩ ± 10%
d) 1 MΩ ± 10%

ii) Internal resistance of an ideal current source is

a) Zero
b) Infinity
c) 0.5 MΩ
d) High

iii) In a pure inductive circuit

a) The current is in phase with the voltage
b) The current lags behind the voltage by 90°
c) The current leads the voltage by 90°
d) The current can lead or lag by 90°

iv) In a step down 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 these

v) According to Kirchhoffs Current Law, the algebraic sum of the currents meeting at a point is always

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

P.T.O.

vi) In the forward bias condition, a diode appears as
a) an OFF switch b) an ON switch
c) infinite resistance d) none of these

vii) The theoretical value of ripple factor for a Centre tap full wave rectifier is
a) 0.482 b) 0.812 c) 1.51 d) 1.21

viii) In voltage regulator circuits, Zener diode is operated in the
a) Forward bias mode b) Reverse breakdown region
c) Knee voltage region d) None of these

ix) In BJT, the current conduction is due to
a) Majority carriers only
b) Minority carriers only
c) Both majority and minority carriers
d) None of the above

x) Transistor biasing represents _____ conditions.
a) D.C. b) A. C.
c) Both A.C. and D.C. d) None of these

xi) In _____ region, a transistor acts as an open switch.
a) cut off region b) saturation region
c) active region d) inverted region

xii) A JFET is a
a) Current controlled device
b) Voltage controlled device
c) Both current and voltage controlled device
d) None of these

xiii) _____ number system uses numerals and alphabets as symbols.
a) Binary b) Decimal
c) Hexadecimal d) Octal

xiv) _____ is the 1's complement notation of the binary number 0001.
a) 1000 b) 1110 c) 1111 d) 0101

xv) _____ also known as reflective binary code.
a) ASCII b) Gray code
c) BCD code d) None of these

PART – B

Answer **any five** questions : (5×7=35)

2. a) With a neat circuit diagram, explain the growth of charge in a series RC circuit excited by a DC source. Define 'Time constant' of this circuit.
   b) What are active and passive components ? Give examples. (5+2)

3. a) When does a practical voltage source behave like a good voltage source ?
   b) State Thevenin's Theorem. With suitable circuit diagrams, explain the steps to Thevenise a resistive network. (2+5)

4. a) Write the three approximations of a diode.
   b) Draw the V-I characteristics of a diode. Define : Knee voltage. (3+4)

5. a) With the help of circuit diagram and waveforms, explain half wave rectifier in detail.
   b) Draw the circuit diagram of transistor voltage regulator. (5+2)

6. a) Draw the output characteristics of a transistor in CE configuration and explain its different regions.
   b) Define the terms 'α' and 'β' for a transistor. (5+2)

7. a) Draw the circuit diagram of voltage divider biasing circuit.
   b) With necessary diagram, explain the working of JFET. (2+5)

8. a) With an example, explain how a decimal number is converted to its equivalent binary code. Consider the integer and fractional parts of decimal number.
   b) Write the BCD code for all decimal digits. (4+3)

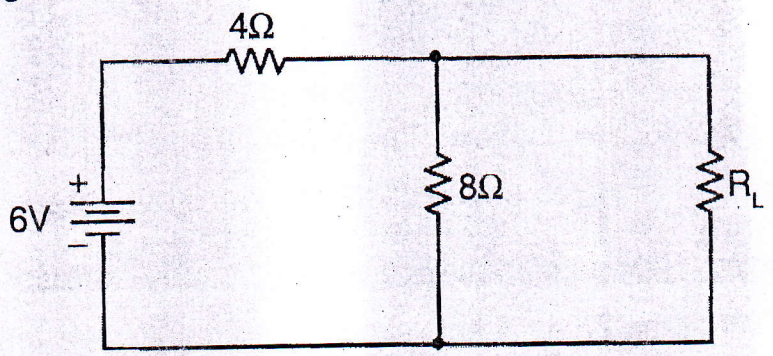
9. With an example, explain binary subtraction using 2's complement method. 7

PART – C

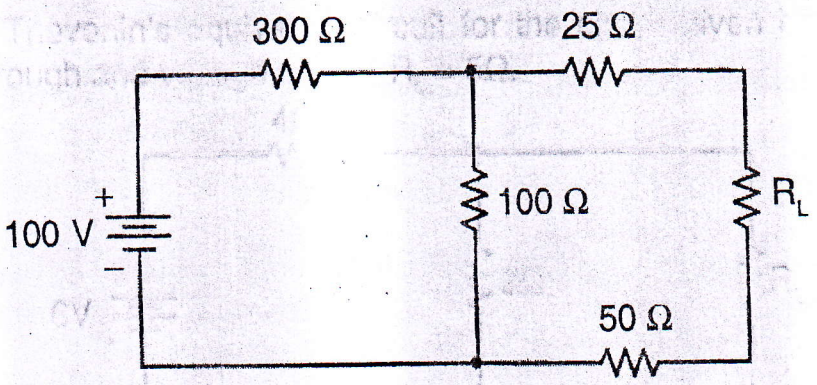
Answer **any four** questions : (4×5=20)

10. A-series resonance circuit has a resistor of 50 Ω, inductor of 50 mH and capacitor of 2nF. Calculate :
    i) Resonant frequency
    ii) Bandwidth when Q factor is 100. 5

11. Draw the Thevenin's equivalent circuit for the circuit given below. Find the current through and voltage across $R_L = 5\Omega$. 5



12. Determine the value of R_L for maximum power transfer in the given circuit. Also calculate the maximum power delivered to the load. 5



13. A transformer used in a half wave rectifier has a turn's ratio of 8 : 1. The primary is connected to 220 V, 50 Hz. Assuming the diode to be ideal, Calculate:
    i) The DC output voltage of the rectifier
    ii) Average current
    iii) PIV of the rectifier diode. 5

14. The following values are recorded to plot an NPN transistor characteristics in CE mode. Determine r_i, r_o and β_{ac} from those values. 5

V_{BE} (volt)	I_B(μA)	V_{CE}(volt)	I_C(mA)
0.625	25	5	2.5
0.675	125	5	12.5
0.675	125	10	13

15. Convert the following numbers accordingly. (3+2)

    a) $42_{(10)}$ = _____(2) = _____(16)

    b) $7E_{(16)}$ = _____(10) = _____(2)