QP – 257

I Semester B.Sc. Examination, April/May 2021
(NS – 2011 – 12 and Onwards) (Repeaters – Prior to 2014 – 15)
ELECTRONICS – I
Basic Electronics

Time : 3 Hours | Max. Marks : 70

Instruction : *Answer **any five** questions from Part – **A**, **four** questions from Part – **B** and **five** sub-questions from Part – **C**.*

PART – A

Answer **any five** questions. **(5×8=40)**

1. a) Write the expression for effective capacitance when capacitors C_1 and C_2 are connected in (i) series and (ii) parallel.

   b) Derive expressions for current, impedance and phase angle of a series RLC circuit. **(2+6)**

2. a) State Kirchhoff's voltage law and current law.

   b) State Thevenin's theorem. With the help of circuit diagrams, explain the steps to Thevenize a resistive network. **(2+6)**

3. a) Explain the working of a capacitor filter with the help of circuit diagram and draw the input and output waveforms.

   b) Explain the operation of a positive clamper circuit for a sine wave input. Sketch the waveforms. **(4+4)**

4. a) Explain the avalanche and zener break down mechanisms.

   b) Mention any two applications of varactor diode. **(4+4)**

5. a) Explain the working of a npn transistor with relevant diagram.

   b) Explain the operation of transistor as a switch. **(4+4)**

6. a) i) What is meant by transistor biasing ? Mention the different types of biasing circuits.

      ii) Define stability.

   b) Define the hybrid parameters for a transistor in CE mode. **(3+1+4)**

P.T.O.

7. a) Draw the ac equivalent circuit of CE amplifier using r_e model and derive the expression for voltage gain. Write the expressions for z_{in} and z_{out}.

   b) Mention the different types of multistage amplifier. **(5+3)**

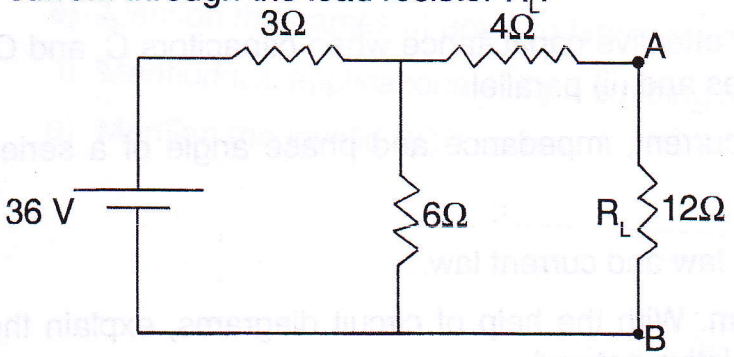
8. a) Explain with an example, the steps to convert a decimal number into its equivalent binary number. Consider the integer and fractional parts of the decimal number.

   b) Write the excess-3 code equivalent for the decimal numbers : 9, 10 and 11. **(5+3)**

PART – B

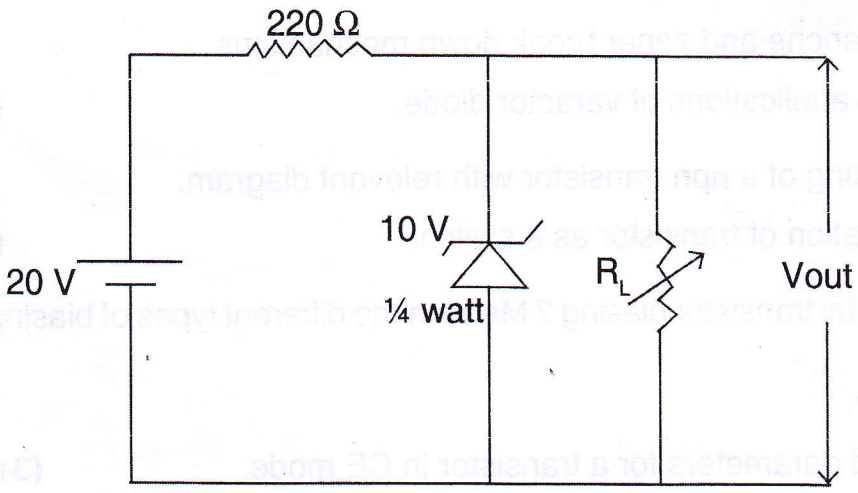
Answer **any four** questions. **(4×5=20)**

9. Draw the Thevenin's equivalent circuit for the network shown and find the current through the load resistor R_L. **5**

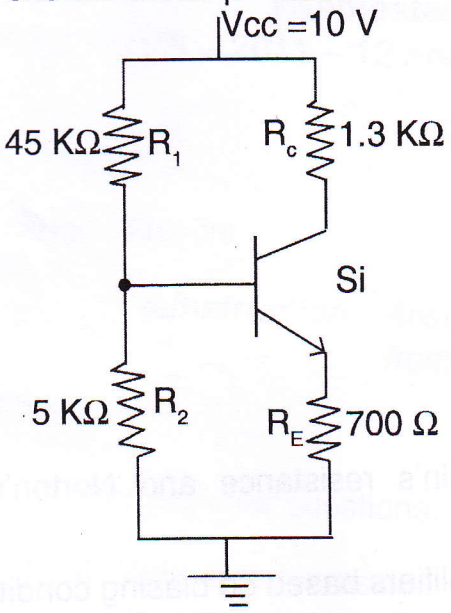


10. A capacitor of 10 μF and resistor of 120 Ω are connected in series to an ac source of 220V, 50Hz. Calculate the current and phase angle. **5**

11. In the following circuit, determine the maximum and minimum values of R_L for which the output voltage remains constant. **5**



12. Draw the D.C. load line and mark the operating point for the biasing circuit shown. Given $\beta = 200$. **5**



13. a) Perform the following mathematical operations.
$8A_{(16)} + 6D_{(16)}$. Express the result in decimal.

b) Write the missing number in the sequence of gray code and its binary equivalent 00, 01, _____, 10. **(3+2)**

14. a) Subtract using 2's complement method

i) $A1_{(16)}$ from $C6_{(16)}$ ii) $63_{(10)}$ from $75_{(10)}$

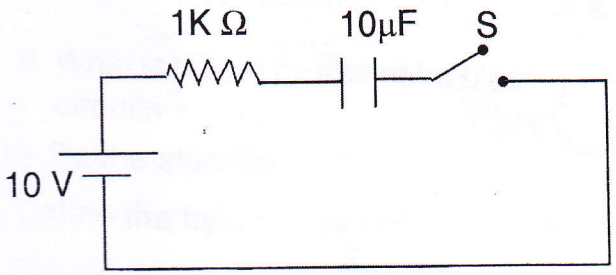
b) Convert $A5F_{(16)}$ into decimal. **(2+2+1)**

PART – C

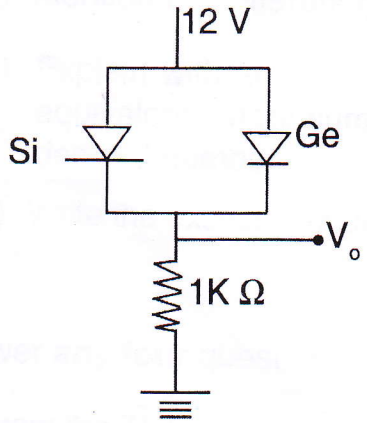
Answer **any five** sub-questions. **(5×2=10)**

15. a) Write the expression for the impedance of an series LCR circuit and draw the resonance curve.

b) As soon as the switch is closed in the circuit shown below, the current rises to 10 mA. Why ?



c) What is the output voltage of the following circuit ?



d) What is the difference between Thevenin's resistance and Norton's resistance ?

e) Mention the names of any two types of amplifiers based on biasing conditions.

f) Mention the applications of light emitting diode.

g) Mention the invalid BCD codes.