ST. JOSEPH'S COLLEGE (AUTONOMOUS), BANGALORE-27
B.Sc. Electronics – I SEMESTER
SEMESTER EXAMINATION –JANUARY 2021
EL 118 – BASIC ELECTRONICS

Time: 2.5 hours   **Maximum marks: 70**

This question paper has **THREE** printed pages and **THREE** parts.

PART – A

Answer any five of the following: 5 X 8 = 40

1. a) Obtain the phase relationship between voltage and current when a.c is applied across a series RC circuit.
    b) Compare series resonance and parallel resonance. Draw frequency response graph of each case.   **(4 + 4)**

2. a) Derive the charging current expression when a series RC circuit is excited by a DC source. Using the expression arrive at the definition of time constant.
    b) State Kirchhoff's laws for circuit analysis.   **(6 + 2)**

3. a) State Thevenin's theorem.
    b) State maximum power transfer theorem.
    c) Draw input/ output wave form of a bridge rectifier and derive expression for the dc output voltage.   **(2 + 2 + 4)**

4. a) Mention any one difference between zener breakdown and avalanche breakdown.
    b) Explain with circuit diagram, the working of a voltage doubler.
    C) Draw the circuit of a biased negative clipper.   **(2 +4 + 2)**

5. a) Draw the output characteristics of a CE transistor and explain how to determine output resistance and β of transistor from the characteristics curves.
    b) Draw fixed bias transistor circuit with emitter resistor and arrive at expression for operating point.   **(4 + 4)**

6. a) Draw r_e model circuit of a CE amplifier with voltage divider bias and obtain expression for Z_i, Z_o, A_i, and A_v .
    b) Draw the circuit of a CC amplifier. Why CC amplifier is called a buffer amplifier?
                                                                          (6 + 2)

7. a) Draw typical drain characteristics and transfer characteristics of JFET.
    b) Draw the construction diagram of enhancement type MOSFET.
    c) Draw circuit diagram of a CMOS inverter.
    d) Compare CE and CB amplifiers with respect to input and output resistances.
   **(2 + 2 +2 + 2)**

PART – B

Answer any five of the following:

5 X 4 = 20

8. A coil having resistance of 120 Ω and inductance 36 H is connected acróss a 12 V battery. Find (i) time constant of the circuit (ii) current after 0.3 seconds (iii) current after 1.5 seconds.

9. Calculate the total resistance across the voltage source and current 1 and current 2 in the circuit below.
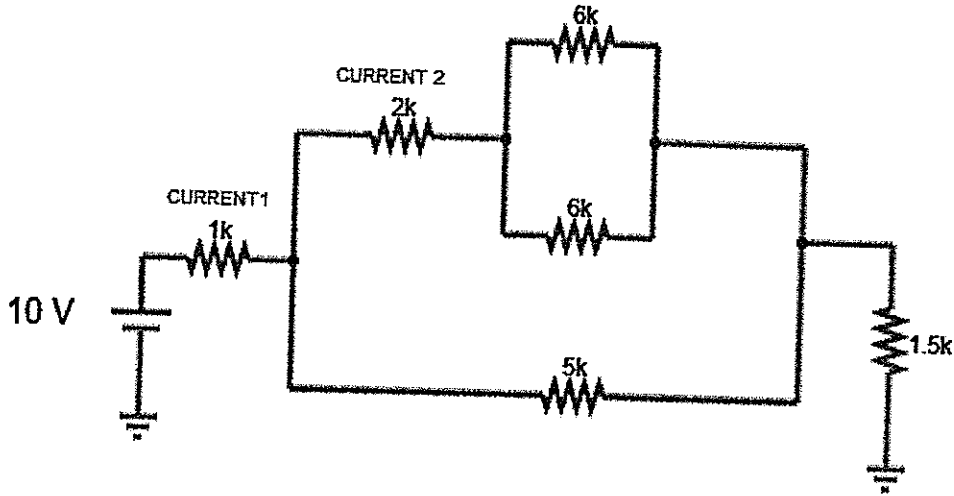

10. Nortonise the following circuit assuming the 4 k resistor as the load.
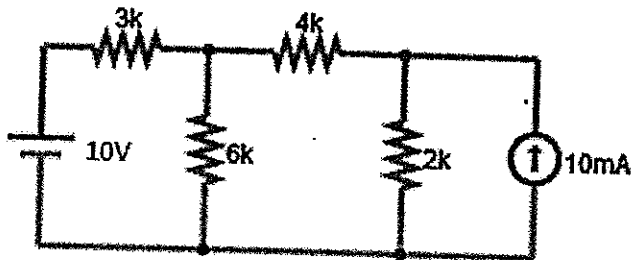
11. Design a zener regulator for the following specifications:
    (i)   Output voltage is 5V
    (ii)   Load current = 20 mA
    (iii)   Zener power dissipation = 500 mW
    (iv)   Input voltage = 12 ± 3 V

12. A half wave rectifier uses a transformer of turns ratio 0:1 . The AC input is 230 V, 50 Hz. Calculate the dc output voltage and current if the load resistance is 1 kΩ. Also calculate the efficiency of the rectifier. Assume that the diode used is ideal.

13. The data sheet of a n-channel FET reveals that I_{DSS} = 12 mA, and $V_{GS(OFF)}$ = -6V. Draw its transfer characteristics.

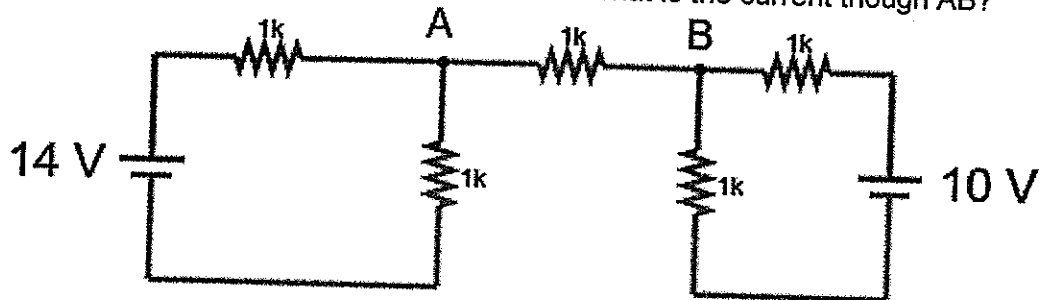14. Calculate the voltage gain of the amplifier shown below. β of the transistor is 120.
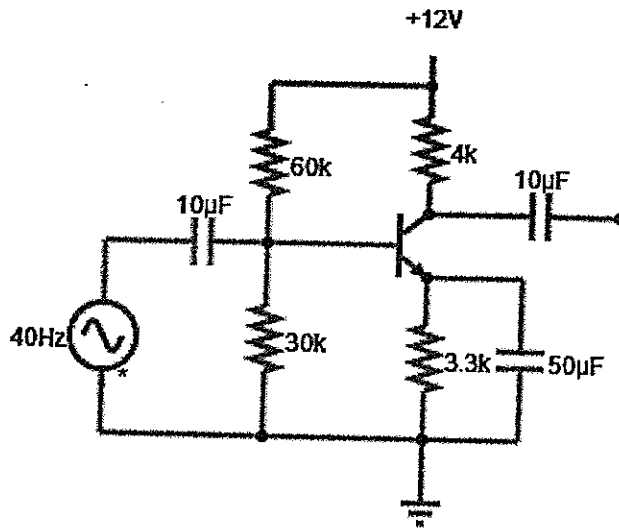
PART-C

Answer any five of the following   **5 x 2 =10**

15. Two resistors of same colour code (RED,RED, BLACK, SILVER) are connected parallel to each other. What is the effective resistance if tolerance is neglected?

16. Is there a potential difference between A and B? What is the current though AB?

17. Compare the collector voltage in a base bias transistor if the base resistor is (i) shorted (ii) opened.

18. Can we interchange L and C in the LC filter of a rectifier? Justify your answer.

19. What is the use of emitter bypass capacitor in a CE amplifier circuit?

20. Draw schematic diagram of a 7 segment LED display.

21. Represent impedance 6+j8 in polar form.

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