VIT
Vellore Institute of Technology

Final Assessment Test (FAT) – June 2022

Programme	B.Tech / M.Tech(Int)	Semester	Winter Semester 2021-22
Course Title	BASIC ELECTRONICS	Course Code	BECE101L
Faculty Name	Prof. Ravi V	Slot	E2
		Class Nbr	CH2021222300387
Time	3 Hours	Max. Marks	100

Section-A (2 X 10 Marks)
Answer All questions

1. A voltage divider circuit supplies reference voltages to various instruments. From Figure 1, [10]

(i) Obtain the voltage drop across AB, voltage drop across R_1, voltage drop across R_2, voltage drop across BC, voltage drop across R_3, voltage drop across R_4, voltage drop across R_5.
(ii) Determine the total current through the circuit.
(iii) What would be the equivalent resistance of the circuit?
(iv) What would be the colour coding for R_3 ?
[10 Marks]

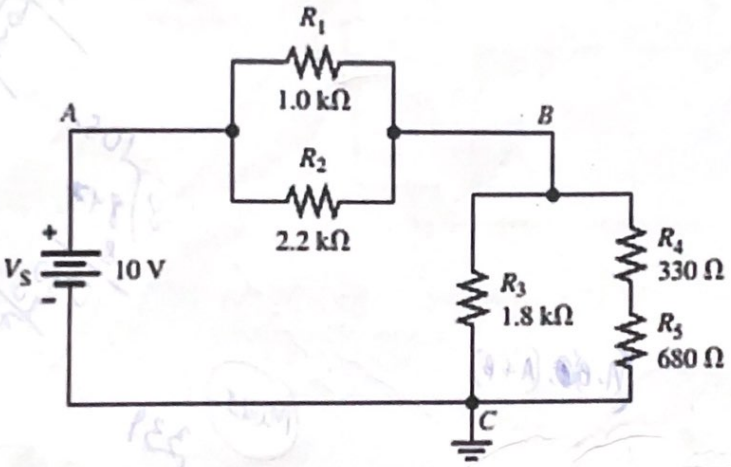

Figure 1

2. a) Discuss in detail about the types of errors that are likely to occur in measuring instruments. **[6 Marks]** [10]
b) Consider an analog voltmeter to measure a voltage drop of about 75 V across a resistor. The reading value in the meter is about 73 V. Find i) Absolute Error ii) Relative Error iii) Accuracy iv) Precision value when the mean of measured value is 74.8V. **[4 Marks]**

Section-B (4 X 15 Marks)
Answer All questions

3. (a) How is the 230V AC input used to charge your mobile phones? What is the type of output? Explain the functionality involved using a suitable diagram. **[12 Marks]** [15]

(b) How can a diode be used as a rectifier and as a voltage regulator? Give an example for each. **[3 Marks]**

4. (a) For the MOSFET amplifier in common source configuration assume V_{DD} =16V, V_D = 6 V, V_{DS}= 8 V, I_D = 5 mA and V_{in} = 40V with 1 KHz. **[10 Marks]** [15]

Determine

(i) The value of R_D and R_S.

(ii) The value of R_2 if R_1= 150 KΩ and V_G = 12 V.

(iii) The value of coupling capacitor whose capacitive impedance should be less than 2 KΩ.

(iv) Draw the circuit diagram.

(b) For the circuit shown in figure 2, find the frequency of oscillation and feedback fraction. **[5 marks]**

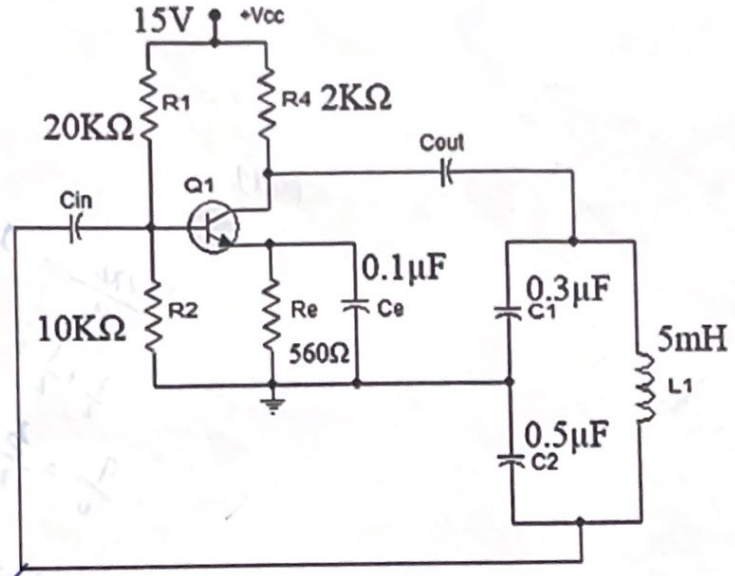

Figure 2

5. (a) Convert the decimal number 6781 to Octal and binary number. **[4 Marks]** [15]

(b) Draw the truth table for the following logic circuit as depicted in figure 3. **[3 Marks]**

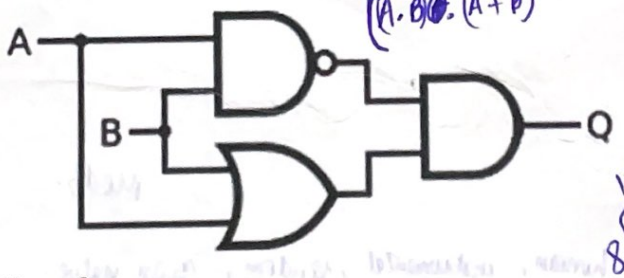

Figure 3

(c) Draw the logic diagram for the Boolean expression (x+y)(x+y')+((xy')+x'). Also, simply this expression to minimum possible literals using Boolean algebra. **[8 Marks]**

6. (a) Describe how displacement can be measured using sensor where the displacement variation is converted as change in electrostatic potential variation. Explain with a neat sketch. **[8 Marks]** [15]

(b) Explain why LVDT is preferable in position sensing over other sensing measurements. **[7 Marks]**

Section-C (1 X 20 Marks)
Answer All questions

7. a) Sketch and discuss transistor (BJT) configuration which has a **(i) Voltage gain less than or equal to one**, (ii) **Voltage gain greater than one with 180° phase shift**. Mention an application for each. **[10 Marks]** [20]

b) Calculate I_B, I_C, I_E, V_{BE}, V_{CE}, and V_{CB} in the given circuit as shown in figure 4. The transistor has $\beta_{DC} = 183$. **[10 Marks]**

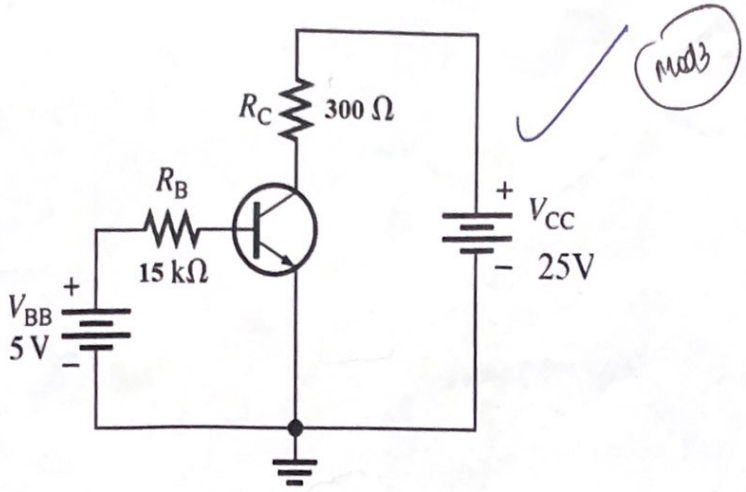

Figure 4