2021

PHYSICS — HONOURS

Paper: CC-3 (Practical)

(Electricity and Magnetism)

Time: 1 Hr. **Full Marks: 30**

Answer ***any one*** of the following

1. (a) Describe the basic principle with a neat diagram for the determination of an unknown resistance by Wheatstone bridge. Can we measure arbitrarily high/small resistance with the help of Wheatstone bridge? Why?
   (b) Compare the working principle of a Carey Foster's Bridge to that of a Wheatstone bridge.
   (c) Describe the theory with a neat diagram to determine an unknown resistance using Carey Foster's Bridge.
   (d) Derive the formula you used in the last question.
   (e) How the check the connectivity of the circuit before the start of the experiment? What precautions are to be taken while performing this experiment? Why high resistance can't be measured with a Carey Foster's Bridge?

   (3+2+3)+2+(6+2+2)+5+(1+2+2)

2. (a) Describe the theory with a neat diagram to study the response curve of a Series LCR circuit. Draw the schematic response curve of this circuit. What precautions are to be taken while recording the data for this response curve?
   (b) What is the impedance at resonance? What is the resonance frequency of a series LCR circuit? What is the role of the series resistance in determining the nature of the response curve?
   (c) What is sharpness of resonance? What is Q factor? How can you determine Q factor and bandwidth from the response curve?
   (d) Why the series LCR circuit is called an acceptor circuit? What is a rejector circuit?

   (4+2+2+3)+(2+2+2)+(2+2+3+2)+(2+2)

3. (a) What do you mean by a high pass and a low pass filter circuit?
   (b) Describe the theory with a neat diagram to study the ac characteristics of a series RC circuit as high pass filter. Draw the schematic response curve.
   (c) Calculate the capacitance to be connected in series with a resistance of 150Ω for a low pass RC filter circuit with a cut-off frequency of 1.5KHz.

(d) Draw the following frequency response curve on a semi-log graph paper and determine the cut-off frequency from the graph:

Frequency (Hz)	1	2	3	4	5	6	7	8	9
V_{out} (V)	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2

Frequency (Hz)	10	20	30	40	50	60	70	80	90
V_{out} (V)	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2

Frequency (Hz)	100	200	300	400	500	600	700	800	900
V_{out} (V)	7.2	7.2	7.2	5.6	0.6	0	0	0	0

Frequency (Hz)	1000	2000	3000	4000	5000	6000	7000	8000	9000
V_{out} (V)	0	0	0	0	0	0	0	0	0

Frequency (Hz)	10000	20000	30000	40000	50000	60000	70000	80000	90000
V_{out} (V)	0	0	0	0	0	0	0	0	0

(2+2)+(5+2+2)+5+(8+4)