PG/IS/ELC-106/15 (Pr.)

M.Sc. 1st Semester Examination, 2015

ELECTRONICS

(*Electronic Circuit Lab*)

(Practical)

PAPER – ELC-106

Full Marks : 50

Time : 3 hours

Answer any **one** question, selecting
it by a lucky draw

The figures in the right-hand margin indicate marks

SET – I

1. Use LM 317 to design a regulated power supply with following specification

   Output Voltage :

   Output Current :

   [Specification may be provided in the lab during examination]

   (*a*) Working formula. 4

   (*b*) Circuit diagram and labelling. 3

   (*c*) Implementation of circuit on breadboard. 3

   (*d*) Record data for load, regulation and line regulation. 5 + 5

   (*e*) Draw necessary graphs. 4 + 4

   (*f*) Calculate percentage if regulation and stability factor. 2 + 2

   (*g*) Discuss on the results obtained. 3

2. Design and study of the performance of a active butter worth low pass filter of the kind of 1st order. Use OPAMP as active element. Specifications :

Cut off frequency . . . . .

Pass band gain . . . . .

[Specifications may be provided in the laboratory during examination.]

Distribution of Marks :

(*a*) Design with working formula. 6 + 2

(*b*) Draw the circuit and label. 3

(*c*) Implement the circuit on breadboard. 3 + 1

(*d*) Record the data for freq. response. 8

(*e*) Draw the graphs. 3

(*f*) Compare the cut-off frequency and roll-off rate for theoritical and experiment value. $\left(3\frac{1}{2}+3\frac{1}{2}\right)$

(*g*) Discuss on the results obtained. 2

3. Use 78xx series of IC regulator to design a regulated power supply (fixed) with the following specifications :

Output Voltage : . . . V

Output Current : . . . . mA

[Exact specifications may be provided in the Laboratory]

(*a*) Design with working formula. 4

(*b*) Draw the circuit diagram and label it. 3

(*c*) Implement the circuit on breadboard. 3

(*d*) Record the data for load and line regulation characteristics. 5 + 5

(*e*) Draw the graphs. 4 + 4

(*f*) Calculate percentage of regulation and stability factor. 2 + 2

(*g*) Discuss on the results obtained. 3

4. Use the OPAMP as an antilogarithmic amplifier and study its performance.

(*a*) Working principle for design considerations. 4

(*b*) Draw the circuit diagram and label it. 3

(*c*) Implement the circuit on the breadboard. 3

(*d*) Record the output data for variation of input voltage in small steps. 10

(*e*) Draw the graphs. 4 + 4

(*f*) Discuss and comment on the possible application of the circuit. 7

5. Design and study the performance of a regulated power supply. Use power transistor and OP-AMP for design. With following specifications :

Output Voltage : . . . . . V,
Output Current : . . . . . mA

(*a*) Design consideration with necessary working formula. 8

(*b*) Draw circuit diagram and label it. 3

(*c*) Implement the circuit on breadboard. 4

(*d*) Record data for load and line regulations. 4 + 4

(*e*) Draw the necessary graphs. 3 + 3

(*f*) Calculate percentage of regulation and stability factor. 2 + 2

(*g*) Discuss on the results obtained. 2

6. Design a single stage CE amplifier. Couple the single stage with second stage using Resistance and Capacitance and study its performance.

(*a*) Design consideration with working formula. 4 + 4

(*b*) Circuit diagram and labelling. 3

(*c*) Implement the circuit on breadboard. 4

(*d*) Record the data for frequency response characteristics. 10

(*e*) Draw graphs. 4

(*f*) Calculate the Bandwidth. 3

(*g*) Discuss the results obtained. 3

7. Design and study the performance regulated power supply using power transistor as pass element and a transistor as a comparator with following specifications.

Output Voltage : . . . V
Output Current : . . . . . mA.

(*a*) Working formula with design consideration. 8

(*b*) Circuit diagram and labelling. 3

(*c*) Circuit implementation on breadboard. 4

(*d*) Recording of data for load and line regulations. 4 + 4

(*e*) Draw graphs. 3 + 3

(*f*) Calculate percentage of regulation and stability factor. 2 + 2

(*g*) Discuss the results obtained. 2

8. Design a high pass Butterworth filter using active element with following specifications.

Cut off frequency : ....

Gain : .....

Study its performance.

(*a*) Working formula with design consideration. 9

(*b*) Circuit diagram and labelling. 3

(*c*) Implement the circuit on breadboard. 3

(*d*) Record of data of frequency response. 8

(*e*) Draw graphs. 4

(*f*) Compare cut-off freq. and roll-off rate between calculated value and experimental value. 3 + 3

(*g*) Discuss the results obtained. 2

9. Use OPAMP as logarithmic amplifier.

(*a*) Design consideration and working principle. 4

(*b*) Draw the circuit diagram and label it. 3

(*c*) Implement the circuit on breadboard. 3

(*d*) Record the output data for variation of input voltage in small steps. 10

(*e*) Draw the graphs. 4 + 4

(*f*) Discuss and comment on the possible application of the circuit. 7

10. Design an active low pass first order Butterworth filter with following specifications and study its performance.

Cut off frequency : ....
Gain : .....

(*a*) Design consideration with working formula. 9

(*b*) Draw the circuit and label. 3

(*c*) Implement the circuit on bread board. 3

(*d*) Record data for frequency response characteristics. 8

(*e*) Draw graphs. 4

(*f*) Compare between calculated value and experimental value of cut-off freq. and roll-off rate. 3 + 3

(*g*) Discuss the results obtained. 2

11. Design a single stage CE amplifier with following specifications and study its performance.

Gain : . . . . . .

(*a*) Design consideration and working formula. 8

(*b*) Draw circuit diagram and label it and implementation of the circuit on bread-board. 3 + 3

(*c*) Record data for frequency chact. 8 + 2

(*d*) Draw graphs. 4

(*e*) Calculate Bandwidth. 4

(*f*) Discuss the results obtained. 3

12. Design an active high pass first order Butterworth filter with following specifications and study its performance

Cut off frequency : . . .
Gain : . . .

(*a*) Design consideration with working formula. 8

(*b*) Circuit diagram with labelling. 3

(*c*) Implementation of the circuit. 3

(*d*) Record of data for frequency response characteristics. 8

(*e*) Draw graphs. 4

(*f*) Compare theoritical value and experimental value of cut-off frequency and roll-off rate. $\left(3\frac{1}{2}+3\frac{1}{2}\right)$

(*g*) Discuss the results obtained. 2

Distribution of Marks :

Experiment	: 35 Marks
Viva-voce	: 10 Marks
Laboratory Note Book	: 05 Marks
Total	: 50 Marks

SET – II

1. Design a regulated power supply using a power transistor as a pass element and an OP-AMP as comparator.

   Output Voltage : . . . V,
   Output Current : . . . mA.

   (*a*) Working formula. 4

   (*b*) Circuit diagram with labelling. 3

   (*c*) Design consideration and components to be used. 4

   (*d*) Circuit implementation on bread board. 4

   (*e*) Recording of data for load and line regulation. 4 + 4

   (*f*) Draw the graphs. 3 + 3

   (*g*) Calculation of percentage regulation and stability factor. 2 + 2

   (*h*) Discuss of the results obtained. 2

2. Design a second order active low pass Butterworth filter and study its performance.

(*a*) Working formula. 4

(*b*) Circuit diagram with labelling. 3

(*c*) Design consideration for cut-off frequency = . . kHz. 5

(*d*) Implementation of the circuit on bread board. 3

(*e*) Recording of data for frequency response characteristics. 8

(*f*) Drawing of graphs. 4

(*g*) Finding and comparison of the cut-off frequency and roll-off rate with the known values. (2 +1) + (2 +1)

(*h*) Discuss of the results obtained. 2

3. Design a regulated power supply using a power transistor as a pass element and another transistor as a comparator :

Output Voltage : . . . V,
Output Current : . . . mA.

(*a*) Working formula. 4

(*b*) Circuit diagram with labelling. 3

(*c*) Design consideration and components to be used. 3

(*d*) Circuit implementation on bread board. 3

(*e*) Recording of data for load and line regulation characteristics. 4 + 4

(*f*) Drawing of graphs. 4 + 4

(*g*) Calculation of percentage regulation and stability factor. 2 + 2

(*h*) Discussion of the results obtained. 2

4. Design a regulated power supply using 78XX group of IC regulator and study its performance :

Output Voltage : . . . V,
Output Current : . . . mA.

(*a*) Working formula. 4

(*b*) Drawing of circuit diagram with labelling. 3

(*c*) Circuit implementation on bread board. 3

(*d*) Recording of data for getting the characteristics of load and line regulation. 5 + 5

(*e*) Drawing of graphs. 4 + 4

(*f*) Calculation of percentage regulation and stability factor. 2 + 2

(*g*) Discussion of the results obtained. 3

5. Design a second order active high pass Butterworth filter and study its performance :

(*a*) Working formula. 4

(*b*) Circuit diagram with labelling. 3

(*c*) Design consideration for cut-off frequency .. kHz. 5

(*d*) Implementation of the circuit on bread board. 3

(*e*) Recording of data for frequency response characteristics. 8

(*f*) Drawing of graphs. 4

(*g*) Finding and comparison of the cut-off frequency and roll-off rate with the known values. (2 +1) + (2 + 1)

(*h*) Discuss of the results obtained. 2

6. Study the performance of an antilogarithmic amplifier using OP-AMP.

(*a*) Working formula. 4

(*b*) Drawing of circuit diagram with labelling. 3

(*c*) Circuit implementation on breadboard. 3

(*d*) Recording of data by varying the input voltage at small steps. 10

(*e*) Drawing the graphs. 4 + 4

(*f*) Discussion about the nature of curves and the results obtained. 3

(*g*) Comment on possible application of the circuit. 4

7. Design an active high pass Butterworth filter at a cut-off frequency of 3 kHz and pass band gain of 2 using only one R-C section and study its performance :

(*a*) Working formula. 4

(*b*) Circuit diagram with labelling. 3

(*c*) Design consideration and components to be used. 4

(*d*) Implementation of the circuit. 3

(*e*) Recording of data for frequency response characteristics. 8

(*f*) Drawing of graphs. 4

(*g*) Finding and comparison of the cut-off frequency and roll-off rate with the given values. $\left(2+1\frac{1}{2}\right)+\left(2+1\frac{1}{2}\right)$

(*h*) Discussions of the results obtained. 2

8. Study the performance of a logarithmic amplifier using OP-AMP.

(*a*) Working formula. 4

(*b*) Circuit diagram with labelling. 3

(*c*) Implementation of the circuit on breadboard. 3

(*d*) Recording of data by varying the input voltage at small steps. 10

(*e*) Drawing of graphs. 4 + 4

(*f*) Discuss the nature of graphs obtained and also the results. 3

(*g*) Comment on possible application of the circuit using the results obtained. 4

9. Design a R-C coupled amplifier using transistors and study its performance :

(*a*) Working formula. 4

(*b*) Circuit diagram with labelling. 3

(*c*) Design consideration for gain = . . . 5

(*d*) Implementation of the circuit on breadboard. 3

(*e*) Recording of data for frequency response characteristics. 10

(*f*) Drawing of graphs. 4

(*g*) Calculation of bandwidth. 3

(*h*) Discussion of the results obtained. 3

10. Design an active low pass Butterworth filter with a roll-off rate 20 dB/decads having cut-off frequency 2 kHz and pass band gain of 2. Study its performance :

(*a*) Working formula. 4

(*b*) Circuit diagram with labelling. 3

(*c*) Design consideration and components to be used. 4

(*d*) Implementation of the circuit on breadboard. 3

(*e*) Recording of data for frequency response characteristics. 8

(*f*) Drawing of graphs. 4

(*g*) Finding and comparison of cut-off frequency and roll-off rate with the supplied values. $\left(2+1\frac{1}{2}\right)+\left(2+1\frac{1}{2}\right)$

(*h*) Discussions of the results obtained. 2

11. Design a regulated power supply of variable output using LM 317, output voltage = 5 V to 7·5 V and output current = 100 mA.

(*a*) Working formula. 4

(*b*) Circuit diagram with labelling. 3

(*c*) Circuit implementation on breadboard. 3

(*d*) Recording of data for load and line regulation. 5 + 5

(*e*) Drawing of graphs. 4 + 4

(*f*) Calculation of % regulation and stability factor. 2 + 2

(*g*) Discussion on the results obtained. 3

Distribution of Marks :

Laboratory Note Book	: 05 Marks
Viva-voce	: 10 Marks
Experiment	: 35 Marks
Total	: 50 Marks