PG/IS/ELC-104/13

M.Sc. 1st Semester Examination, 2013

ELECTRONICS

(*Analog Electronics*)

[Theory]

PAPER –ELC-104

Full Marks : 50

Time : 2 hours

Answer **Q. No. 1** and any **three** from the rest

The figures in the right-hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

Illustrate the answers wherever necessary

1. Answer *all* questions : 2 × 5

    (*a*) With the help of frequency response curve at a first order high pass filter explain its roll off rate.

(b) What is the advantage of SMPS over linear voltage regulator ?

(c) Why synchronizing pulses are used in television system ?

(d) Why harmonics would be produced in an amplifier ?

(e) Draw the equivalent electrical circuit of a piezoelectric crystal.

2. (a) Explain Schmitt trigger with suitable circuit diagram. Give input and output waveforms. 5

(b) Draw the circuit diagram of an active high pass second order Butterworth filter and explain it operation. Derive the expression of the transfer function. 5

3. (a) Give the block diagram of a standard power supply unit. 2

(b) Explain the principle of operation of a series voltage regulator using op-amp. 3

(c) Explain a BUCK converter using suitable circuit diagram.   5

4. (a) Mention, two natural substances which shows piezoelectric effect.   2

(b) Draw Pierce crystal oscillator and mention the working of each of the component.   3

(c) Give the circuit diagram and describe the operation of a triangular wave generator. Derive the expression for frequency at output signal.   5

5. (a) Explain working principle of PLL. What are capture-in-range and lock-in-range ?   5

(b) Describe how picture transmision takes place in case of monochrome television.   5

6. (a) Write down the advantages of class-C amplifier over other amplifiers.   2

(b) A class-C transistor amplifier is operating at 150 kHz. The transistor is conducting for

1 μs in each cycle. The saturation values for
the transistor are $I_{C(SAT)} = 100$ mA

$$V_{CE(Sat)} = 0.2 \text{ V}$$

Assuming ideal pulse approximation and the
output swinging over the entire load line,
find the average power dissipation. 3

(c) What do you mean by transducer and sensor ?
Explain the action of a photo transducer with
a suitable diagram. 2 + 3

[*Internal Assessment* : 10 Marks]