M.Sc. Physics Semester - I

Phys-C-104 : Digital Electronics and Operational-Amplifier

Paper Code : 4515

Time : 2Hrs 30 Min APRIL - 2016 MM: 70

Note: Attempt all questions. Figures to the right indicate marks. Use neat figures to explain.

1. (a) Explain 1-line to 4-line de-multiplexer with necessary logic diagram,function table and equation. [6]

   (b)Design SOP circuit that will generate an odd parity bit for a 4-bit input. Write necessary Boolean expression. Draw logic diagram and truth table. [6]

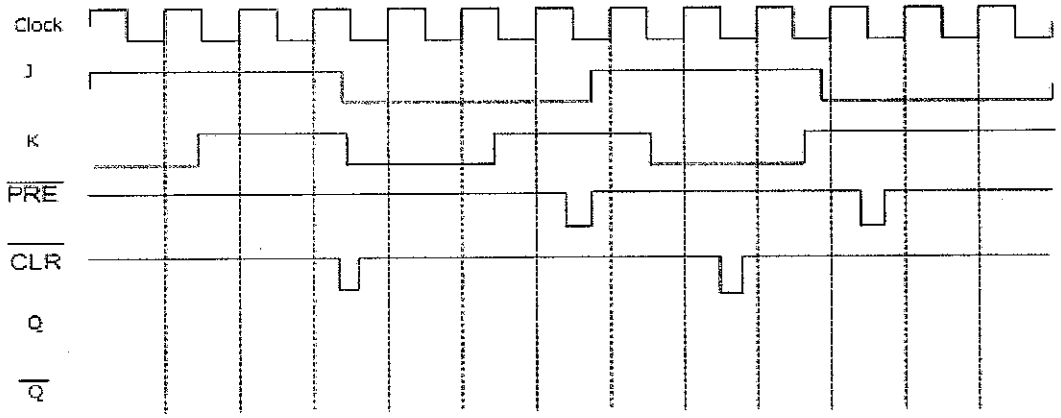
   (c) Give any four names of display devices. [2]

OR

1. (a) Design 16-bit even parity checker using IC 74180s and explain with necessary diagram. [7]

   (b) Explain keyboard encoder with necessary circuit. [7]

2. (a) Draw out put waveform for following input data applied to negative edge triggered flip flop. [4]



   (b) Convert a R-S flip-flop into a clocked D-flip-flop. Why is a clock needed in digital timing circuits? [7]

   (c) Explain toggling in a JK flip-flop. If a clock of 1 KHz is input on the Toggle flip-flop, what will be its output frequency? [3]

OR

2. (a)Explain NAND gate S-R latch using necessary logic diagram,timing diagram and verify truth table. [7]

   (b)Explain master-slave J-K flip flop using necessary Logic diagram truth table and timing diagram. [7]

3. (a) Explain the effects of propagation delay in ripple counter. [4]

   (b) Design and explain four bit up-counter using negative edge-triggered flip [10]

flop with logic diagram and timing diagram.

OR

3. (a) Explain two bit ripple up and ripple down counter using necessary logic diagram and timing diagram with negative edge triggered flip flops. [7]

   (b) Explain parallel-in serial-out shift register with block diagram and logic diagram. [6]

   (c) What does the triangle on the clock input of a J-K flip-flop mean? [1]

4. (a)Design low pass filter with cutoff frequency 5 kHz with pass band gain of 3. [6]

   (b)What do you mean by quadrature oscillator?Draw its circuit diagram. Explain in brief. [6]

   (c)Calculate required values of components used in it while designing with oscillating frequency 159Hz. [2]

OR

4. (a) Draw the schematic diagram of a sawtooth generator. Explain its operation. Also draw its input and output waveforms. [8]

   (b) Explain all pass filter with necessary circuit diagram, and out put waveforms. For all pass filter, find the phase angle if the frequency of input voltage is 1kHz. [6]

5. (a) Explain the 555 as an adjustable multivibrator with circuit diagram, output waveforms which show final output voltage waveform and voltage across capacitor. Write necessary expressions. [7]

   (b) In above design of multivibrator let R_A=2.2kΩ, R_B=3.9kΩ, and C=0.1 uF. Determine the positive pulse width t_c and free running frequency f_o. [3]

   (c) What is Phase Lock Loop? Explain it with a block diagram. [4]

OR

5. (a) Explain the R-2R DAC using its circuit diagram, equation for output and its transfer curve (i/p vs o/p). [7]

   (b) Classify voltage regulators. Explain fixed voltage regulators in detail. [7]