SARDAR PATEL UNIVERSITY
M.Sc. (PHYSICS) Ist Semester Examination
Monday, 16th April, 2018   2:00 pm to 5:00 pm
Course No.: PS01CPHY23: Analog and Digital Electronics

All questions are compulsory.

Total Marks:70

Q.1 Multiple choice questions. (8)

(1) Which of the following devices has more than one PN-junction?
    (a) LED   (b) Solar-Cell   (c) SCR   (d) UJT

(2) The reverse recovery time of a diode arises due to the _____.
    (a) minority carriers in the depletion-region
    (b) minority carriers in the n- & p-regions
    (c) majority carriers in the n- & p-regions
    (d) majority carriers in the depletion-region

(3) Diode clipper circuits_____.
    (a) change the shape of input wave (b) do not change the shape but shift the level of input wave   (c) do both a and b as per requirement
    (d) None

(4) Radiative recombination of charge carriers take place in case of LED if it is made up from _____;
    (a) Direct band-gap semiconductor (b) Indirect band-gap semiconductor
    (c) Both a and b   (d) None

(5) Which of the following is a cyclic or unit distance code?
    (a) 8421 (b) Gray code (c) Excess-3 code (d) ASCII code

(6) A certain binary counter circuit uses four Flip-Flops. What will be the modulus of this counter?
    (a) 16   (b) 32   (c) 512   (d) 256

(7) Which of the following is an example of sequential circuits?
    (a) Adder   (b) Decoder
    (c) Subtractor   (d) Comparator

(8) The counter type ADC is also known as a _____ ADC
    (a) Tracking type   (b) Flash type
    (c) Successive approximation type   (d) Digital Ramp type

Q.2 Short answer questions.(Attempt any seven) (14)

(1) Differentiate between phototransistor and photodiode.
(2) Discuss the working action of diode as a switch.
(3) Why OPAMP is also known as differential amplifier?
(4) What is the difference between comparator and Schmitt trigger?
(5) What are sequential codes?
(6) State advantages and limitations of parallel and serial counters.
(7) Define propagation delay time and glitch in a counter circuit.
(8) What is Digital to Analog convertor? Mention its important applications.

(9) Distinguish between volatile and non-volatile semiconductor memory.

Q.3(a) Write a note on LED. (6)

(b) Discuss in detail about the diode clamper circuits. (6)

OR

(b) Explain the construction and working principle of TRAIC. What are its applications? (6)

Q.4(a) Why IC-741 is known as Op-Amp? Sketch its block diagram and explain its working. (6)

(b) Construct an astable multivibrator circuit using IC-555 and explain its working. (6)

OR

(b) What is Voltage Control Oscillator (VCO)? Construct a VCO circuit using IC-741 and explain its working. (6)

Q.5(a) Differentiate between weighted and non-weighted codes and discuss any two BCD codes in detail. (6)

(b) Explain working of a full adder circuit with the help of a logic diagram and truth table. (6)

OR

(b) Differentiate between synchronous and asynchronous counter and explain the working of any one of this 4-bit up-counter. (6)

Q.6(a) Define resolution and accuracy of a D to A convertor. Also find the percentage resolution of a 12 bit DAC. What will be the full-scale output voltage if it has the step size of 50 mV? (6)

(b) Explain basic principle of DAC and discuss DAC using Op-Amp. (6)

OR

(b) With the help of neat circuit diagram and output waveform, discuss the counter type A/D convertor. Why does the conversion time increases with the value of the analog input voltage in this ADC? (6)

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