

BD-103

May-2015

S.Y. B.Sc., Sem.-IV

CC-205 : Electronics

Time : 3 Hours]

[Max. Marks : 70

- Instructions :** (1) All questions are compulsory.
 (2) The numbers to the right denote marks.
 (3) All symbols have their usual meaning.

1. (A) What is meant by Laplace transform of $f(t)$? What is the condition for $f(t)$ to be Laplace transformable ? Find the Laplace transform of the following functions : **7**
- (i) $f(t) = t$ (ii) $f(t) = t^n$
 (iii) $f(t) = \sin h \alpha t$ (iv) $f(t) = \cos h \alpha t$

OR

Using Laplace transformation, solve the following differential equation :

$$\frac{d^2i}{dt^2} + 4 \frac{di}{dt} + 8i = 8 u(t) \text{ given that } i(0+) = 3 \text{ and } \frac{di(0+)}{dt} = -4$$

- (B) Discuss the step response of a series RC circuit. For the same circuit, obtain the particular solution for current $i(t)$ after the switch is closed at time $t = 0$. Assume that there is no charge on the capacitor before switching. **7**
- Given : $V = 10 \text{ V}$; $R = 2 \Omega$; $C = 0.1 \text{ F}$

OR

Discuss the response of parallel R-L-C circuit to exponential driving current.

2. (A) What is "Fourier Series" ? Explain how the Fourier Coefficients a_0 , a_n and b_n can be evaluated. **7**

OR

A square voltage signal has the following values :

$$\begin{aligned} v(t) &= -V & ; 0 < t < T/4 \\ &= V & ; T/4 < t < 3T/4 \\ &= -V & ; 3T/4 < t < T \end{aligned}$$

Find the Fourier series for this waveform.

- (B) Obtain the Fourier coefficients for a periodic rectangular pulse. Also discuss the effect of duty ratio α/T on the coefficient \overline{C}_n . **7**

OR

Obtain Fourier transform of the impulse function and the exponential function.

3. (A) Draw the circuit diagram, symbol and truth table of clocked RS flip-flop and explain its working. 7
- OR**
- Discuss the parallel in – parallel out shift register with the help of its logic diagram.
- (B) Draw the logic symbol and truth table of an edge-triggered D flip-flop and explain its working. 7
- OR**
- Discuss the serial in – serial out shift register with the help of its logic diagram.
4. (A) Which are the four primary microprocessor – initiated operations ? Define the address bus, data bus and the control bus and explain their functions in reference to the 8085 μ p. 7
- OR**
- Explain memory organization and memory map. Also explain how memory addresses are assigned to a memory chip.
- (B) With the help of an illustration explain how the “Instruction Fetch” operation is executed. 7
- OR**
- Define tristate logic and explain why these devices are essential for the proper functioning of the bus-oriented system. Giving examples explain the function of a buffer.
5. Answer in a sentence or two : 14
- (1) What is meant by a Laplace transform pair ?
 - (2) What is the Laplace transform of e^{at} ?
 - (3) Draw the voltage – time graph of $u(t)$.
 - (4) What is a periodic signal ?
 - (5) Define an even function.
 - (6) What is meant by an ideal transmission system ?
 - (7) What do the letters R and S stand for in the term “RS Latch” ?
 - (8) A 74LS279 is a quad latch. What does quad mean ?
 - (9) What does an entry “X” mean in a flip-flop truth table ?
 - (10) How long will it take to shift an 8-bit number into a 54164 shift register if the clock is set at 10 MHz ?
 - (11) What is a decoder ?
 - (12) What happens when the reset pin of 8085 μ p is activated ?
 - (13) If the chip size is 2048×8 bits, how many chips are required to make up 16 K byte memory ?
 - (14) How many address lines are required for identifying an I/O device in peripheral – mapped I/O ?