

# POSSESSION OF MOBILES IN EXAM IS UFM PRACTICE.

Name DEVA

Enrollment No. 32

Jaypee Institute of Information Technology, Noida

End Semester Examination, 2023-24  
B.Tech., 4<sup>th</sup> Semester

Course Title : Digital Systems  
Course Code: 18B11EC213

Maximum Time : 2 Hr  
Maximum Marks: 35

CO1	Understand the fundamentals of number system, Boolean algebra function minimization techniques.
CO2	Applying the concepts of Boolean algebra to implement combinational circuits and flip flops using logic gates.
CO3	Analyze state diagram and construct sequential logic circuits using flip flops. Also, classify the signals & systems and analyse the signals using Fourier transform.
CO4	Determine the various steps involved in the digitization and transmission of signals and evaluate their performance parameters.

Note: Attempt all the questions.

Q.1 (a) Subtract  $(2B)_{16}$  from  $(7F)_{16}$  using 16's complement method.

(b) Convert  $(163.875)_{10}$  to binary.

[CO1 (Understanding), 2+1 Marks]

Q.2 Obtain minimal expression for  $F(A, B, C, D) = \sum m(0, 2, 4, 6, 7, 8, 10, 12, 13, 15)$  using K-map method. Also, implement the obtained minimal expression using NAND gate.

[CO1 (Understanding), 5 Marks]

Q.3 (a) What is race-around condition in J-K latch. Explain it with the help of waveform.

(b) An AB flip-flop is constructed using J-K flip-flop as shown in Fig. 1. Obtain the expression of next state  $Q(t+1)$  in terms of A, B, and  $Q(t)$ .

[CO2 (Applying), 2.5+2.5 Marks]

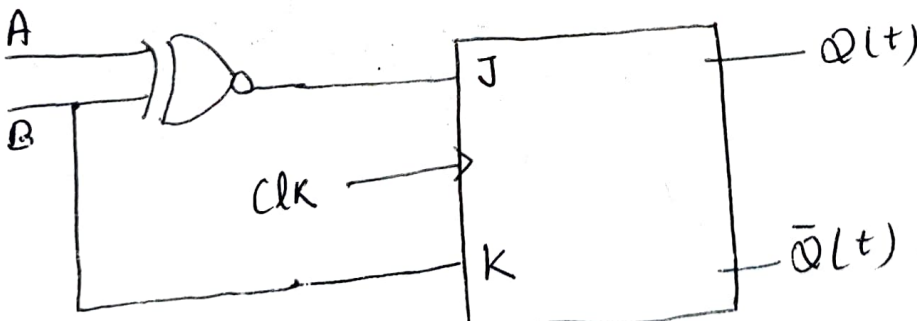


Fig. 1

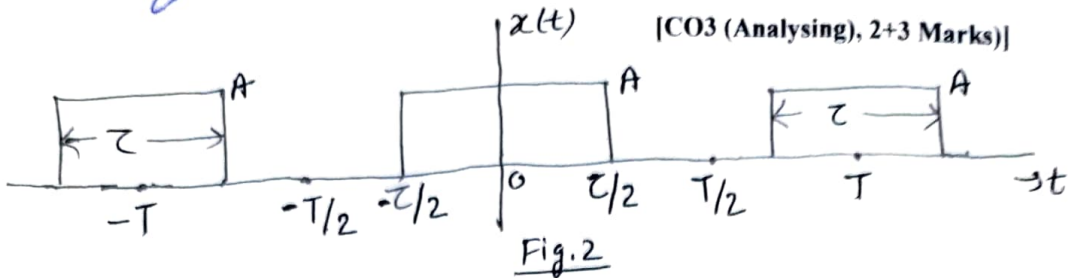
(PTO)

Q. 4 (a) Determine whether the signal  $y(t) = x(t) x(t-2)$  is:

(i) Linear or Non-linear

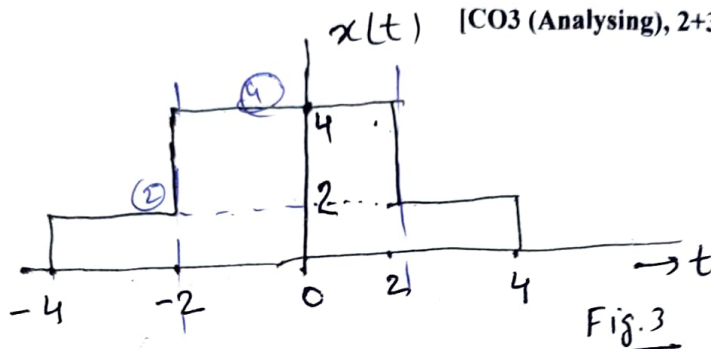
(ii) Time invariant or Time varying

(b) Find out exponential Fourier series of following signal:



Q. 5 (a) Find out Fourier transform of  $e^{-3t}u(t-2)$  using Fourier transform property.

(b) Find out Fourier transform of following signal:



Q. 6 An analog signal  $x(t) = 3\cos 20\pi t$  is sampled by multiplying the train of impulse signal,  $h(t) = \sum_{n=-\infty}^{\infty} \delta(t - nT_s)$  with sampling frequency 50 Hz. Draw the sampled signal in both time and frequency domain.

[CO4 (Evaluating), 5 Marks]

Q. 7 (a) A signal  $x(t) = 5\cos 10\pi \times 10^6 t$  Volt is applied to a uniform quantizer followed by a 3-bit encoder. The signalling rate of the system is  $30 \times 10^6$  bits/sec. Find out, number of quantization level, step size in quantization, maximum quantization error, signal to quantization noise ratio, transmission bandwidth for which system operates satisfactory.

(b) A binary signal 100101 modulate a carrier signal  $A_c \cos 2\pi f_c t$ . Draw the BASK and BPSK waveform.

[CO4 (Evaluating), 5+2 Marks]

$$\begin{array}{r} 128 \\ 139 \end{array}$$

(3)

8  
+ 3 (11)