RAN-2103000206021005

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B. Sc. (Sem. - VI) Examination April - 2023

Physics : Paper - X PH-610 (New)

Analog and Digital Electronics

[Total Marks: 50

સૂચના : / Instructions

(1) **નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.**
Fill up strictly the details of ☛ signs on your answer book

Name of the Examination:

☛ **B. Sc. (Sem. - VI)**

Name of the Subject :

☛ **Physics : Paper - X PH-610 (New) Analog and Digital Electronics**

Subject Code No.: **2103000206021005**

Seat No.:

Student's Signature

(2) Draw neat diagrams wherever necessary.
(3) Symbols used in the paper have their usual meaning.
(4) Question 1 is compulsory and figures to the right indicate full marks of the question.

Q. 1. Answer the following questions in short: (10)

1. Define differential and summing amplifier.
2. An ideal operational amplifier has infinite bandwidth. (True/False)
3. Another name for a unity gain amplifier is _____.
4. In negative feedback amplifier stand for ICIS and VCIS.
5. In which multi-vibrator timmer-555 the pulse width equation is W= 1.1RC.
6. What is Schmitt trigger and TTL clock?
7. In Hartley oscillator feedback fraction equation _____ and minimum voltage gain equation _____.
8. Define 555-timmer.
9. What is flip flop?
10. For flip flop, which logic gate is used for designing.

Q. 2. (A) **Write any one of the following:** **(06)**

(1) Define OP-AMP. Derive voltage gain equation for inverting amplifier.

(2) Write short note on instrumentation amplifier.

(B) **Write any one of the following:** **(04)**

(1) What is slew rate? If the measured output voltage changes 0.8 V in 0.2 μs, calculate slew rate.

(2) Write short note on summing amplifier circuit.

Q. 3. (A) **Write anyone of the following:** **(06)**

(1) What is oscillator? Obtain an expression for the frequency of oscillation for Colpitt oscillator using transistor.

(2) What is multi-vibrator? Describe the operation of Astable 555-timmer.

(B) **Write any one of the following:** **(04)**

(1) Write feedback fraction and minimum voltage gain equation for Colpitt oscillator. Find the frequency of oscillation of a Colpitt oscillator which uses C_1 = 200 PF, C_2 = 300 PF and L = 30 μH.

(2) Design Wein bridge oscillator at f_o = 965 Hz frequency for value of capacitor is 0.05 μF.

Q. 4. (A) **Write anyone of the following:** **(06)**

(1) Write short note on TTL-clock circuit.

(2) Write short note on Schmitt trigger circuit.

(B) **Write anyone of the following:** **(04)**

(1) In mono-stable timmer-555 supply voltage V_{cc} = 12 V with resistance 33 kΩ and capacitance 0.47 μF. What is the minimum trigger voltage that produces an output pulse? What is the maximum capacitor voltage? What is the width of the output pulse?

(2) Draw functional block diagram of a timmer-555 Astable or free running mode.

Q. 5. (A) **Write anyone of the following:** **(06)**

(1) Describe the operation of basic RS-flip flop using NOR gate without clock.

(2) Design master-slave JK-flip flop with clock using universal logic gate.

(B) **Write anyone of the following:** **(04)**

(1) Write short note on RS-flip flop using NAND gate without clock.

(2) Write short note on Edge trigger JK-flip flop with truth table.

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