RAN-2103000205021005

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T. Y. B. Sc. (Physics) (Sem. - V) Examination March - 2023

Physics : Paper - X (PH - 510)

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:

☛ **T. Y. B. Sc. (Physics) (Sem. - V)**

Name of the Subject :

☛ **Physics : Paper - X (PH - 510) Analog and Digital Electronics**

Subject Code No.: **2103000205021005**

Seat No.:

Student's Signature

(2) Draw neat diagrams wherever necessary.
(3) Symbols used in the paper have their usual meaning.
(4) Figures to the right indicate full marks of the question.
(5) Scientific calculator may be used.

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

(1) Full form of IGFET and MOSFET.

(2) Write the name application of SCR.

(3) Write the input characteristics of OP-amp.

(4) Define input bias current and current mirror.

(5) Draw the circuit diagram of loaded differential amplifier.

(6) Define K-map and don't care conditions in digital system?

(7) Define multiplexer and demultiplexer in digital system.

(8) Draw K-map construction of four variables.

(9) Convert the hexadecimal number $(F9A.B)_{16}$ into its equivalent of decimal number.

(10) In EX-OR gate both the input is different, what is output in EX-OR gate.

Q. 2 (a) Attempt any one of the following in details: **(06)**

(1) Explain construction and working of the depletion -mode MOSFET with curves

(2) Explain construction and working of SCR.

(b) Attempt any one of the following: **(04)**

(1) D-MOSFET has the values V_{gs}(off) = –3V and I_{dss} = 6mA. What will be the drain current equal when V_{gs} equals = –lv, –2v, 0v, +l v and +2v?

(2) Determine R_{BI} and V_{BB} for silicon UJT if η0.8, V_P = 10.3v and R_{B2}= 5kΩ.

Q. 3 (a) Attempt any one of the following in details: **(06)**

(1) Write short note on DC-Analysis of differential amplifier with necessary circuit diagram and equation.

(2) Discuss input characteristics of an OP-AMP

1. Input bias current
2. Input offset current
3. Base current and offset.

(b) Attempt any one of the following: **(04)**

(1) What are the currents and voltages in the single-ended output circuit values given below V_{cc} = 15v, R_e = 7.5kΩ and R_c = 5KΩ.

(2) Write short note on common mode gain.

Q. 4 (a) Attempt any one of the following in details: **(06)**

(1) Describe the karnaugh map method for simplification of Boolean function.

(2) State and prove de-morgance first and second theorem using truth table.

(b) Attempt any one of the following: **(04)**

(1) Write short note on product of sum (POS).

(2) A and B are two Boolean variable show that AB+AB=AB+AB in Boolean algebra.

Q. 5 (a) Attempt any one of the following in details: **(06)**

(1) What do you mean by a 4 to 1 MUX and 1 to 4 D-multiplexer? Give both logic circuit of the same.

(2) Show how a magnitude comparator works.

(b) Attempt any one of the following: **(04)**

A) Write short note on parity generator and checkers.

B) Write short note on encoder in digital system.

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