B.Sc. 4th Semester (Honours) Examination, 2021-22

PHYSICS

Course ID: 42413 **Course Code: SHPHS/403/C-10/T-10**

Course Title: **Analog Systems and Applications (T-10)**

Time: 1Hour 15 Minutes **Full Marks: 25**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words
As far as practicable

Section-I

1. Answer any ***five*** questions: $1\times5=5$

(a) Write down the relation between α and β of transistor.
(b) What is CMRR?
(c)What is the characteristic of class B amplifier?
(d) What is virtual ground?
(e) Mention two important advantages of using Si over Ge for semiconductor device.
(f) Explain the static and dynamic resistance of a semiconductor diode.
(g) State Barkhausen's criterion for self-sustained oscillation.
(h) Give example of a device which shows negative resistance?

Section-II

2. Answer any ***two*** questions: $5\times2=10$

(a) Draw the circuit diagram of a RC phase shift oscillator and find its operating frequency. 2+3
(b) Define ripple factor. Find the ripple factor of a bridge rectifier. 1+4
(c) State the principle of operation of LED showing the band diagram. Write down the difference between LED and Photodiode. 4+1
(d) Drawing a proper circuit diagram and explain how OP-AMP can be used as logarithmic amplifier. 2+3

Section-III

3. Answer any ***one*** question: $10\times1=10$

(a) i. Draw the I-V characteristic of JFET and explain it. What is pinch-off voltage? 2+2+1
ii. Calculate the values of I_C and I_E for a transistor with α_{dc} = 0.99 and I_{CBO} = 5μA. I_B is measured as 20μA. 2+3
(b) Draw the frequency response of RC coupled amplifier and explain the graph. Draw the h parameter equivalent circuit of two stage RC coupled amplifier and find its mid frequency gain. (2+3+2+3)