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Total No. of Printed Pages: [2]

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B.Sc. (Hons.) Physics (Semester – 3rd)
ANALOG SYSTEM AND APPLICATIONS
Subject Code: BPHYS-1301
Paper ID: [23131509]

Time: 03 Hours

Maximum Marks: 60

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A

(2 marks each)

Q1. Attempt the following:

- a) What is meant by Zener breakdown?
- b) What is Barkhausen criterion?
- c) Define Mobility and discuss the factor on which mobility depends
- d) What is the use tank circuit in oscillators?
- e) It is desirable to have high input impedance for a transistor amplifier, why?
- f) Show that $I_C = \beta I_B + (1 + \beta)I_{CBO}$.
- g) Define ripple factor and efficiency of a rectifier.
- h) What is slew rate? Discuss the circuit model of an ideal Op-Amp
- i) Distinguish between class A and class B amplifiers with the help of load line and Q point.
- j) Define and describe CMRR.

Section – B

(5 marks each)

- Q2. Explain with a neat diagram RC coupled amplifier. Obtain the expressions for its voltage gain in low and middle frequency regions. Sketch the frequency response curve.
- Q3. Explain negative and positive feedback using block diagrams? Discuss the effect of negative feedback on the input impedance of the amplifier.
- Q4. Discuss the principle and structure of Photodiode and Solar Cell. What is the difference between two?
- Q5. Explain the working of an n-p-n transistor in common base connection with circuit diagram. Find the expression for collector current.
- Q6. An amplifier has a current gain of 250 and a bandwidth of 400KHz without feedback. If feedback factor of 0.01 is applied, what is the bandwidth of the amplifier now?

Section – C

(10 marks each)

- Q7. What is bias stabilization and why it is needed? Draw the circuit of a voltage divider bias and explain its advantages over others.
- Q8. (a) Explain the functioning of a bridge type full wave rectifier, and deduce the expression for the efficiency and ripple factor.
(b) Design an operational amplifier circuit to be used as (a) a differentiator, and (b) an integrator
- Q9. Explain the working of Hartley's oscillator with the help of a circuit diagram and also write the expressions for feedback and frequency fractions. What are the drawbacks of L-C based oscillators?