

## U.G. 4th Semester Examination - 2020

**PHYSICS**

[HONOURS]

Course Code : PHYH-CC-T-10

Full Marks : 40

Time :  $2\frac{1}{2}$  Hours*The figures in the right-hand margin indicate marks.***GROUP-A**

1. Answer any **five** questions:  $2 \times 5 = 10$
- What do you understand by an ideal diode? Draw its VI characteristics.
  - Define peak inverse voltage for a diode.
  - Explain the term thermal runaway regarding BJT.
  - Define CMRR for an OPAMP.
  - Draw a circuit diagram of an emitter follower.
  - Explain how barrier potential is set up in a p-n junction diode.
  - Write down Barkhausen's criterion for self-sustained oscillations.
  - Draw the circuit diagram of a class-B Push-Pull amplifier using transistor.

*[Turn Over]***GROUP-B**

2. Answer any **two** questions:  $5 \times 2 = 10$
- Explain avalanche breakdown. Draw VI characteristics of Zener diode and explain how a Zener regulates voltage.  $2+1+2$
  - Draw self bias circuit for BJT. Explain how the bias curve is used to find the Q-point of the circuit.  $1+4$
  - Discuss the two-port representation of a transistor and hence define the h-parameters.  $1+4$
  - Define bandwidth of an amplifier. If  $f_l$  and  $f_h$  are the lower and upper half power frequencies of one amplifying stage find the corresponding values for N stages.  $2+3$

**GROUP-C**

3. Answer any **two** questions:  $10 \times 2 = 20$
- Prove that the ripple factor of a half-wave rectifier is 1.21 and that of a full-wave rectifier is 0.482.  $5+5$
  - Define loop gain for a feedback circuit. Describe Hartley oscillator with a circuit diagram. Hence find the expression for the frequency of oscillation.  $2+3+5$

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c) What do you mean by A/D conversion? Draw circuit diagram of a D/A converter using R-2R ladder and find out the expression of output.

2+3+5

d) Write down the properties of an ideal OP-AMP. What do you mean by virtual ground? Design a circuit using one or more OPAMP whose output is given by  $v_0 = (2v_1 + 16v_2)$  where  $v_1$  and  $v_2$  are two inputs. Draw a simple circuit diagram of an integrator using OPAMP.

2+2+4+2

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