U.G. 4th Semester Examination - 2021

PHYSICS

[HONOURS]

Course Code : PHY-H-CC-T-10

Full Marks : 20 Time : 1 Hour

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

GROUP-A

1. Answer any **five** questions: 1×5=5

   a) Write down Barkhausen's criterion for self-sustained oscillations.

   b) Explain how barrier potential is set up in a p-n junction diode.

   c) Define CMRR for an OPAMP.

   d) Define peak inverse voltage for a diode.

   e) What do you understand by an ideal diode? Draw its VI characteristics.

   f) Explain the term thermal runway regarding BJT.

   g) Draw the circuit diagram of a class-B Push-Pull amplifier using transistor.

   h) Draw a circuit diagram of an emitter follower.

GROUP-B

2. Answer any **one** question: 5×1=5

   a) 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

   b) Draw self bias circuit for BJT. Explain how the bias curve is used to find the Q-point of the circuit. 1+4

   c) Discuss the two-port representation of a transistor and hence define the h-parameters. 1+4

GROUP-C

3. Answer any **one** question: 10×1=10

   a) 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

b) 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

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

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