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42024

M. Sc. (Physics) 4th Semester Examination – May, 2019

ELECTRONICS-II

Paper : PHY(S) 404

Time : Three hours] ***[Maximum Marks : 80***

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt ***five*** questions in all, selecting ***one*** question from each Unit. Question No. **1** is ***compulsory***. All questions carry equal marks.

1. (a) Describe external photoelectric effect detectors with examples. 4 × 4 = 16

(b) What are the advantages of FM over AM ?

(c) Describe OP-AMP as stable AC - coupled amplifier.

(d) Describe OP-AMP as sample and hold circuit.

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UNIT – I

2. (a) Explain the construction & working of solar cell. Find its open circuit voltage, short circuit current & fill factor. 10

(b) Describe the construction and process of generation of photocurrent in microchannels. 6

3. Explain the construction and working of :

(a) Photomultiplier tubes 8

(b) Avalanche photodiode. 8

UNIT – II

4. (a) An AM transmitter has antenna current of 2 A with modulation index of 60 percent. What will be the total antenna current if one more identical antenna is connected in parallel with the previous one, keeping the transmitter output same ? Will it affect modulation index ? 8

(b) Describe pulse width modulation and pulse code modulation. 8

5. (a) Describe balanced modulator. Explain how the circuit produces side bands without carriers ? 10

(b) Explain product detector and illustrate its circuit diagram. 6

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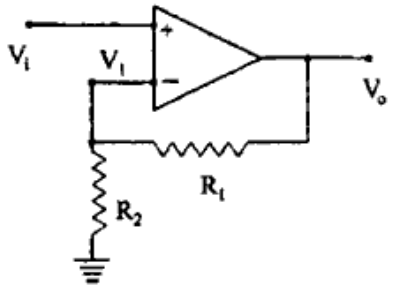
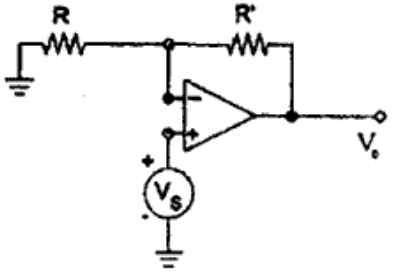
UNIT – III

6. (a) Draw the circuit of an emitter coupled differential amplifier and explain why CMRR → ∞ for symmetrical circuit with Re → ∞.

(b) Find the output V_0 in the circuit below with A = 105, Vi = –1 V, R_1 = 125 kΩ and R_2 = 25 kΩ, also find V_1 at amplifier input :



7. (a) OP-AMP having infinite input resistance, zero output resistance and a voltage gain A_v. For the given circuit, find the gain with feedback (A_{vf}) :



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Draw the circuit of OP-AMP as voltage to current converter with (i) grounded load, (ii) bridge amplifier and explain their operation. 10

(b) Draw the circuit of OP-AMP as voltage to current converter with (i) grounded load, (ii) floating load and explain their operation. 6

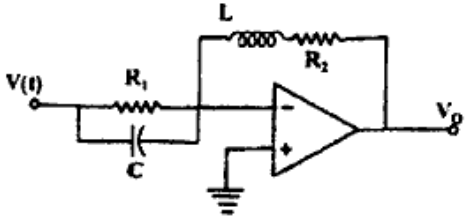
UNIT – IV

8. (a) Design weight resistor type digital to analog converter along with its digitally controlled switch. 8

(b) Design triangle wave generator using op-amp. 8

9. (a) Describe antilogarithmic amplifier and first order Butterworth using op-amp. 10

(b) Find the Output voltage in term of the variables provided in the figure below. Assume op- amp as an ideal one. 6



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