D 92958 (Pages : 2) Name.....

Reg. No.....

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, DECEMBER 2015

(CUCSS)

Physics

PHY 1C 04—ELECTRONICS

(2012 Admission onwards)

Time : Three Hours Maximum : 36 Weightage

Part A

Answer **all** *questions.*
Each question carries 1 *weightage.*

1. What is transconductance ? Give the relation between transconductance and gate source cut-off voltage.
2. Briefly explain the working of E-MOSFET.
3. Explain how the negative resistance region of a tunnel diode is used in the design of tunnel diodes.
4. Give the basic principle of the working of LDR. Mention its application.
5. What is an IR emitter ? How does it work ?
6. Define : (a) Common mode signal ; (b) Difference mode signal ; (c) CMRR ; (d) What is the value of CMRR for an ideal op-amp ?
7. Give *two* characteristics of a non-inverting amplifier.
8. Draw the circuit of an op-amp as a scale changer.
9. What is a clocked flip-flop ? Name *two* inputs of a clocked flip-flop.
10. What are ripple counters ? Give its disadvantages.
11. Compare CMOS with TTL.
12. What is a zero crossing detector ?

(12 × 1 = 12 weightage)

Part B

Answer any **two** *questions.*
Each question carries 6 *weightage.*

1. Draw the circuit of a common source amplifier with load resistor R_d in the drain circuit and an additional resistor R_s in the source to ground circuit. Draw the Thevenin's equivalent circuit looking into the drain. Derive the expressions for voltage gain and output resistance.

Turn over

2. Explain the principle of working of a semiconductor laser. How is population inversion achieved in a semiconductor ? Describe the construction and working of a PN Junction Laser.
3. Discuss the Dominant Pole Compensation method. What are the merits and demerits of this method?
4. Explain the operation of a JK flip-flop. Give its truth table. What is a race around condition of a JK flip-flop ? How is it eliminated in master slave JK flip-flop ?

(2 × 6 = 12 weightage)

Part C

Answer any **four** *questions.*
Each question carries **3** *weightage.*

1. A solar cell is realized in a semiconductor having bandgap of 1.3 V. Estimate the maximum possible short circuit current of the cell for AM 1.5 spectrum.
2. Determine the energy in eV associated with photons of green light of wavelength 5000 Å.
3. Design a low-pass filter for a cut-off frequency of 2 kHz and pass band gain of 2.
4. Explain the working of an op-amp as a summing amplifier.
5. Expand A (B + A) B to maxterms and min terms.
6. Draw the circuit diagram equivalent circuits and truth table of the NMOS gate.

(4 × 3 = 12 weightage)