DOON UNIVERSITY, DEHRADUN

End Semester Examination, Second Semester, 2017-18

School of Physical Sciences
MSc Physics (Optoelectronics)
Course: PHC-405 Electronics

Time Allowed: 3Hours   ***Maximum Marks: 50***

Note: Attempt All Questions from Sections A, B, C.
There is choice in section C.

### SECTION: A   *(Marks: 10 X 2 = 20)*

1. Evaluate (a) $A + 1$ (b) $A + A'$ and (c) $A\,A'$.
2. What electrical characteristic of intrinsic semiconductor material is controlled by the addition of impurities?
3. If small amount of antimony (Sb) is added to Ge
  (a) The resistance increases
  (b) Ge will become a p-type semiconductor
  (c) Sb becomes an acceptor impurity
  (d) There will be no freer electrons than holes in a semiconductor
4. Draw logical block diagram of 4-bit parallel adder.
5. State the differences between synchronous and asynchronous counters.
6. Explain **in brief** the master-slave J-K flip-flop.
7. Why -3dB points in frequency response curve are selected as lower and upper cut-off frequency?
8. How many type of buses are used in 8085 microprocessor? Write their name and number of lines in each.
9. What is accumulator in 8085 microprocessor? Discuss its importance?
10. Why OPAMPs are so popular?

SECTION: B   *(Marks: 4 X 5 = 20)*

11. A 4-variable switching function is given by $f = \sum(5, 7, 8, 10, 13, 15) + d(0, 1, 2)$, where d is the do-not-care-condition. Write the minimized form of f in sum of products (SOP) form.
12. (a) In the given 4-to-1 multiplexer, if C1 = 0 and C0 = 1, then calculate the output M
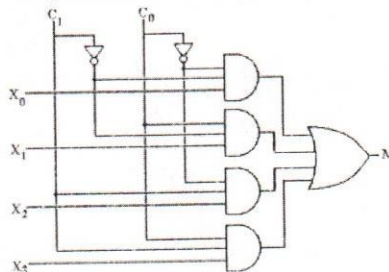
(b)If small quantities of boron is added to pure Si, would you expect the room

temperature electrical conductivity of the resulting material to be greater than, less than, or same as that of pure Si? Why?

13. Explain in detail the design and working of an analog to digital converter (ADC).

14. What are various flags used in 8085 microprocessor and how they are used?

15. Explain the working of Schmitt trigger in detail with waveforms. Discuss its importance.

SECTION: C (*Marks: 5 X 2 = 10*)

16. Draw a truth table for 3 input full adder. Write Boolean expression for the Sum and Carry. Simplify the Boolean expressions and draw block diagram.

OR

17. What is a differential amplifier? Explain in detail the design and working of a dual input, balanced output differential amplifier.

18. Discuss the application of OPAMP as integrator and differentiator in detail.

OR

19. What is an active filter? What are different types of active filters? Explain the circuit of Butterworth first order high pass filter by using OPAMP and draw the frequency response curve. If lower cut-off frequency is 10 kHz, C = 0.01 micro-Farad, calculate the value of resistance to be used in RC filter.