



9-12-16

**DOON UNIVERSITY, DEHRADUN**  
**End Semester Examination, Third Semester, 2016-17**  
**School of Physical Sciences**

**Generic Elective test paper of 5 Year (Integrated) MSc Program**  
**Course: PHG-201: Digital, Analog and Instrumentation**

*Time Allowed: 3Hours*

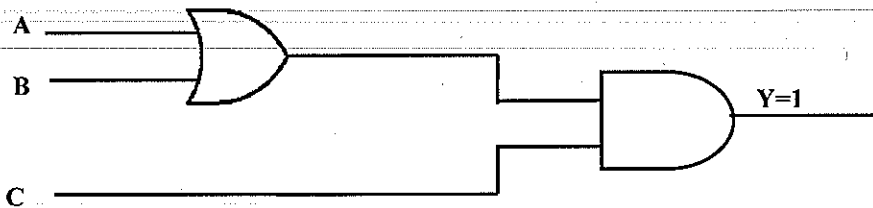
*Maximum Marks: 30*

*Note: Attempt All Questions from Sections A, B, C.*

**SECTION: A**

*(Marks: 10)*

1. What will be the value of inputs, to get an output Y=1 from the following circuit



2. Differentiate between digital and analog signals.
3. State De Morgan's theorems.
4. What do you understand by sweep voltage?
5. State whether the given expression  $Y = \overline{A} \cdot B \cdot C + \overline{A} \cdot \overline{B} \cdot \overline{C}$  is min or max term. Convert into its equivalent term.
6. Explain the Zener and Avalanche breakdown.
7. Calculate the value of base current ( $I_B$ ) and current gain ( $\alpha$ ) in a common base configuration  $I_E = 1 \text{ mA}$ ,  $I_C = 0.95 \text{ mA}$ .
8. When Germanium is doped with trivalent and pentavalent impurities respectively, what kind of majority carriers will be in the respective doped semiconductor.
9. Draw the block diagram of OP-AMP when used as an integrator and write down the expression for the output.

**SECTION: B**

*(Marks: 10)*

10. Subtract the following using 2 complement's method  
 (i) 10 from 12 (ii) 50 from 40 (iii) 25 from 40 (iv) -5 from -9
11. Draw the logic circuit for

$$Y = \overline{(\overline{A}B + A\overline{B}) + (\overline{B}C + B\overline{C}) + (\overline{A}C + A\overline{C})}$$

12. Explain the current-voltage characteristics in forward and reverse bias p-n junction diode.
13. What is an oscillator and write the Barkhausen criterion for oscillations.
14. What is an operational amplifier (OP-AMP), briefly explain the symbolic representation of inverting and non-inverting mode of an OP-AMP.

**SECTION: C**

**(Marks: 10)**

15. What do you understand by cathode ray oscilloscope (CRO). Discuss the main components of CRO and draw a labelled diagram of cathode ray tube with explanations.
16. What is a transistors, explain the different symbolic representation, components and modes. Explain the current-voltage characteristics of common-emitter configuration for a PNP transistor.