Name of the Student: _____

Question No. 1. Encircle the correct option.   **(20)**

i.   A NAND gate gives high output only when
   a. both inputs are low   b. both inputs are high c. both inputs are different   d. both inputs are similar
ii. A transistor can be used as
   a. diode   b. rectifier   c. amplifier   d. modulator
iii. The output of transistor used as Common Emitter amplifier is
   a. positive   b. negative   c. zero   d. very low
iv. If we decrease I_B then I_C will
   a. increase   b. decrease   c. remain constant   d. becomes zero
v.   The basic logic gate whose output is '1' when input is '0'
   a. AND   b. OR   c. NOT   d. NAND
vi. The output of XOR gate is low when both the inputs are
   a. high   b. low   c. similar   d. opposite
vii. Photo diode is used for detection of
   a. current   b. heat   c. light   d. resistance
viii. Conversion of A.C. to D.C is called
   a. amplification   b. modulation   c. rectification   d. oscillation
ix. When pn junction is reversed biased, the width of depletion region
   a. increases   b. decreases   c. remains constant   d. becomes infinite
x.   The potential barrier of diode made from silicon is
   a. 0.7 V   b. – 0.7 V   c. 0.3 V   d. 0.5 V
xi. Collector current in the transistor is greater than base current due to
   a. large Vcc   b. large size of collector   c. thin base   d. all of these
xii. If $R_1 = \infty$ and R2 = 0, then gain G of a non- inverting operational amplifier is
   a. - 1   b. +1   c. zero   d. infinite
xii. The expression for current gain is given by
   a. $\beta = Ic/I_B$ b. $\beta = I_B/Ic$ c. $\beta = I_B+Ic$ d. Ic - I_B
xiv. LDR is a
   a. pressure sensor   b. photodiode   c. light sensor   d. it is not a sensor
xv. The mathematical notation for NAND gate is
   a. $\overline{X=A+B}$ b. X=A+B   c. X=A . B   d. $X = \overline{A . B}$
xvi. Transistors can be made from
   a. plastics   b. metals   c. intrinsic semiconductors   d. extrinsic semiconductors
xvii. The potential barrier in diode stops the movement of
   a. holes only   b. electrons only   c. both electrons and holes   d. none of these
xviii. A transistor has a collector current 10 mA and base current 40 µA. Its current gain is
   a. 400   b. 250   c. 200   d. 125
xix. The no. of diodes used for full wave rectifier are
   a. 1   b. 2   c. 3   d. 4
xx. The photocells are used for
   a. security system   b. counting system   c. automatic door system   d. all of these

Question No. 2 Write short answers.   **2x6=12**
   i.   Draw a circuit symbols of n-p-n and p-n-p transistors
   ii.   Why ordinary diodes do not emit light?
   iii.   What is the net charge on a n-type or a p-type substance?
   iv.   What is the effect of forward and reverse biasing of a diode on the width of depletion region?
   v.   Why photodiode is operated in reverse biased state?
   vi.   What is a potential barrier? Give its value for Si and Ge.
   vii.   Give four application of a photodiode.
   viii. What are the biasing requirements for CE transistor as an amplifier?

Q. No. 3 a) Define operational amplifier. Also calculate gain of inverting operational amplifier.   **(5)**
      b) The current flowing into the base of transistor is 100 µA. Find its collector current, its emitter current and ratio of collector current to emitter current if gain of the transistor is 100.   **(3)**
                                    OR
Q.No. 4 a) How can be common emitter transistor be used as an amplifier? Calculate its voltage gain.   **(5)**
      b) Calculate the gain of in non-inverting operational amplifier if R_1= 10 kΩ and R_2 = 40 kΩ.   **(3)**