

Registration No :

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Total Number of Pages : 02

BTech  
RBL18002

1<sup>st</sup> Semester Regular / Back Examination: 2021-22  
BASIC ELECTRONICS ENGINEERING  
BRANCH(S): AEIE, AG, AUTO, BIOMED, BIOTECH, CHEM, CIVIL,  
CSE, CSEAI, CSEAIME, CST, ECE, EEE, ELECTRICAL,  
ELECTRICAL & C.E, ELECTRONICS & C.E, ETC, IT, MECH,  
METTA, MINERAL, MINING, MME

Time : 3 Hour

Max Marks : 100

Q.Code : OF688

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part-I

Q1

Answer the following questions :

(2×10)

- What is the approximate mobility of holes in Germanium at room temperature?
- A half-wave rectifier has an input voltage of 240 V r.m.s. If the step-down transformer has a turns ratio of 8:1, what is the peak load voltage? Ignore diode drop.
- In a transistor,  $I_C = 100$  mA and  $I_E = 100.2$  mA. Find the value of  $\beta$ .
- The phase difference between the input and output voltages in a common base arrangement is ..... degree.
- A silicon transistor is biased with base resistor method. If  $\beta=100$ ,  $V_{BE} = 0.7$  V, zero signal collector current  $I_C = 1$  mA and  $V_{CC} = 6$ V, what is the value of the base resistor  $R_B$ ?
- When is a vertical channel E-MOSFET used?
- In an OPAMP  $A_{DM} = 3500$  and  $A_{CM} = 0.35$ . Calculate the value of CMRR.
- What is the advantage of connecting negative feedback in OPAMP circuits?
- Find the 2's complement of binary number 0101.
- Why NAND-NAND realization is preferred over AND-OR realization?

Part-II

Q2

Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)

(6×8)

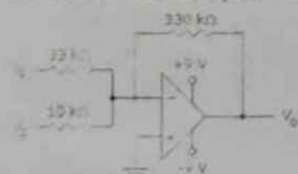
- What is the basis for classifying a material as a conductor, semiconductor, or a dielectric? What is the conductivity of perfect dielectric?
- Define diffusion current in a semiconductor.
- What is the effect of temperature on the reverse saturation current of a diode?
- Explain how Zener diode maintains constant voltage across the load?
- What do you understand by collector reverse saturation? In which configuration does it have a greater value?
- The output of a 60Hz full-wave bridge rectifier has a 60Hz ripple. Is this circuit working properly?

- g) Why the use of a bypass capacitor in a CE amplifier circuit important? Explain.
- h) State assumptions made for analyzing ideal op-amp.
- i) Design a logic circuit using basic gates with three inputs A, B, C and output Y that goes low only when A is high and B and C are different.
- j) Explain how Op-Amp can be used as
  - i) Integrator ii) Inverting Summer
- k) Implement the XOR gate using only NAND gates
- l) Explain the use of excess-3 code.

**Part-III**

**Only Long Answer Type Questions (Answer Any Two out of Four)**

- Q3 (a) With appropriate circuit diagram explain the DC load line analysis of semiconductor diode. (5)
- (b) In a full wave rectifier, the input is from 30-0-30V transformer. The load and diode forward resistances are  $100\Omega$  and  $10\Omega$  respectively. Calculate the average voltage, dc output power, ac input power, rectification efficiency and percentage regulation. (6)
- (c) Explain the working of positive clamping circuit. (5)
- Q4 (a) In a Common Emitter transistor circuit if  $\beta = 100$  and  $I_B = 50\mu A$ , compute the values of  $\alpha$ ,  $I_E$  and  $I_C$ . (5)
- (b) With a neat circuit diagram explain the Voltage Divider Bias circuit by giving its exact analysis. (6)
- (c) Explain the Enhancement and Depletion mode of JFET along with their Transfer Curves. (5)
- Q5 (a) Convert (6)
- i)  $(1AD.E0)_{16} = (?)_{10} = (?)_8$
  - ii)  $(356.15)_8 = (?)_2 = (?)_{10}$
- (b) Design Full Adder and Implement it using two half adders. (6)
- (c) State and prove DeMorgan's Theorems for three variables. (4)
- Q6 (a) Calculate the output voltage of the circuit given below, if  $V_1 = -0.2 V$  and  $V_2 = 0 V$  (6)



- (b) How many op-amps are required to implement this equation? (4)

$$V_0 = - \left( \frac{R_f}{R_2} V_2 - \frac{R_f}{R_1} \frac{R_f}{R_1} V_1 \right)$$

- (c) Calculate the input voltage of the the circuit given below if  $V_0 = -11 V$ . (6)

