



AUTUMN END SEMESTER EXAMINATION-2022

1st Semester B.Tech

BASIC ELECTRONICS

EC10001

(For 2022 Admitted Batch)

Time: 3 Hours

Full Marks: 50

Answer any SIX questions.

Question paper consists of four SECTIONS i.e. A, B, C and D.

Section A is compulsory.

Attempt minimum one question each from Sections B, C, D.

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable and all parts of a question should be answered at one place only.

SECTION-A

1. Answer the following questions. [1 × 10]
- (a) Describe the effect of temperature on the electrical conductivity of Semiconductor?
 - (b) Define PIV rating in diode. Write the PIV for half wave rectifier.
 - (c) State Snell's law.
 - (d) Which gates are called Universal gate and why?
 - (e) Compare the performance of FET over BJT?
 - (f) Which transistor configuration amplifier is best to use and why?
 - (g) Explain why collector region is made larger compared to emitter and base region?
 - (h) Summarize the characteristics of an ideal op-amp.

- (i) A differential dc amplifier has a differential mode gain of 100 and a common mode gain of 0.01. What is its CMRR in dB?
- (j) Show the symbol and truth table of EXOR gate.

SECTION-B

- 2. (a) With proper diagram explain the operation of centre tap full wave rectifier. Also find its efficiency and ripple factor. [4]
- (b) Show the I-V characteristics of a Zener diode. Also explain the working of a Zener diode as a voltage regulator. [4]
- 3. (a) Construct a NPN transistor in CE configuration circuit and draw its Input & Output characteristics Showing different region of operation with proper labeling. [4]
- (b) What is the importance of Quiescent point in transistor biasing? Explain fixed biasing in detail. [4]

SECTION-C

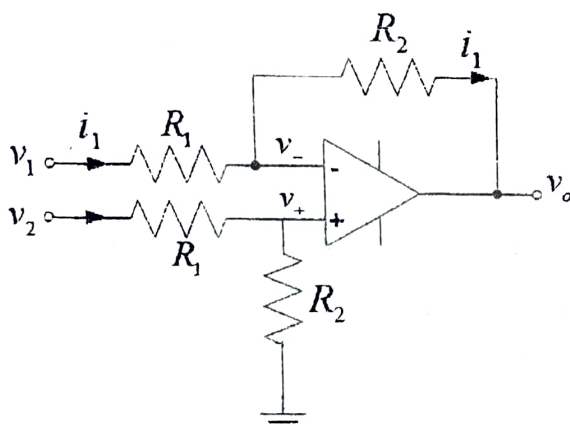
- 4. (a) Analyze and explain the op-amp circuit which invert the input signal with amplification and formulate its output voltage expression. Define CMRR and write its importance in design aspect. [4]
- (b) What is an adder circuit? Construct a half adder circuit and explain its operation with truth table? [4]
- 5. (a) With suitable diagram analyze the operation of N-channel Enhancement MOS with symbol. [4]
- (b) Explain the working principle of n-channel JFET. A JFET is operating at $I_D = 5 \text{ mA}$. The pinch-off voltage of the JFET is -8V and $V_{GS} = -4.7 \text{ V}$. Solve for the value of I_{DSS} . [4]

6. (a) Illustrate the operation of LED with suitable diagram and write its applications. [4]
- (b) What is the need for modulation? Distinguish between Amplitude Modulation and Frequency Modulation. [4]

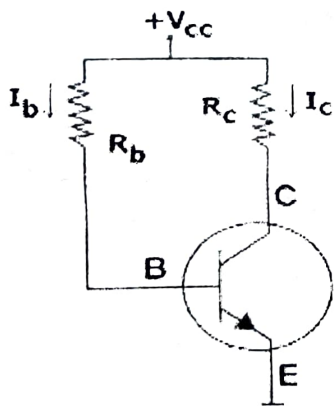
SECTION-D

7. (a) Draw and explain the circuit diagram of a non-inverting amplifier using OP-AMP and derive their output voltage expression [4]

Estimate the output voltage of the below circuit if $V_1=2V$ and $V_2=5V$, $R_1=5k\Omega$ and $R_2=10k\Omega$.



- (b) The silicon transistor circuit in the following figure has $V_{cc}=10V$, $R_c=2.2k\Omega$, and $I_B=10\mu A$. Calculate R_b , I_c , V_{CE} and V_E . Given $\beta=100$. [4]



8. (a) Draw the block diagram and truth table of SR flip flop. [4]
Describe how the disadvantage of SR flip-flop is overcome in JK flip-flop.

(b) Solve the following conversions [4]

(i) $(30.625)_{10} = ()_2$

(ii) $(2FA.4FA)_{16} = ()_{10}$

(iii) $(575.26)_8 = ()_2$

(iv) $(100110.101)_2 = ()_8$
