[3861]-161

F. E. (Semester - II) Examination - 2010
BASIC ELECTRONICS ENGINEERING
(2008 Pattern)

Time : 3 Hours]   [Max. Marks : 100

Instructions :

(1) Answer **any three** questions from each section.

(2) Answers to the **two sections** should be written in **separate answer-books**.

(3) Black figures to the right indicate full marks.

(4) Neat diagrams must be drawn wherever necessary.

(5) Use of electronic pocket calculator is allowed.

(6) Assume suitable data, if necessary.

SECTION - I

Q.1) (A) The reverse saturation current at 300°K of a P-N junction Ge diode is 5μA. Find voltage to be applied across the junction to obtain a forward current of 50 mA. **[05]**

(B) The input signal voltage to the full wave rectifier is $160 \sin [2\pi \times 60)t]$ V. Assume $V_r = 0.7V$ for each diode, calculate :

(a) Required turn ratio of the transformer to produce a peak output voltage 25V

(b) PIV of each diode

(c) Output Frequency **[05]**

(C) Write short notes : **[06]**

(a) Seven Segment Display

(b) Multiplexed Display

OR

Q.2) (A) Explain how the D.C. Output Voltage of a Full Wave Rectifier is improved when capacitor filter is used ? Draw waveforms of the load voltage and diode currents. **[06]**

(B) A loaded zener regulator is shown in fig. 1. V_z = 5.1V, at I_{zt} = 49mA, I_{zk} = 1mA, Z_2 = 7Ω and I_{zm} = 70 mA. Determine minimum and maximum input voltage that can be regulated. [10]
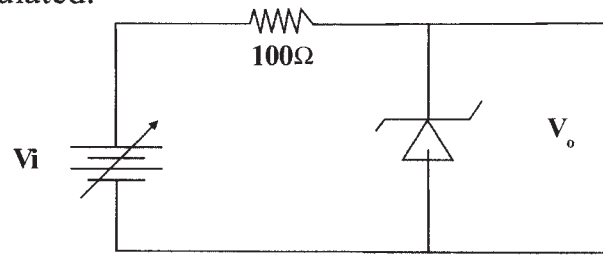

Fig. 1

Q.3) (A) Draw common-base input characteristics of a transistor. What is Early Effect ? How can it account for the CB input characteristics ? [08]

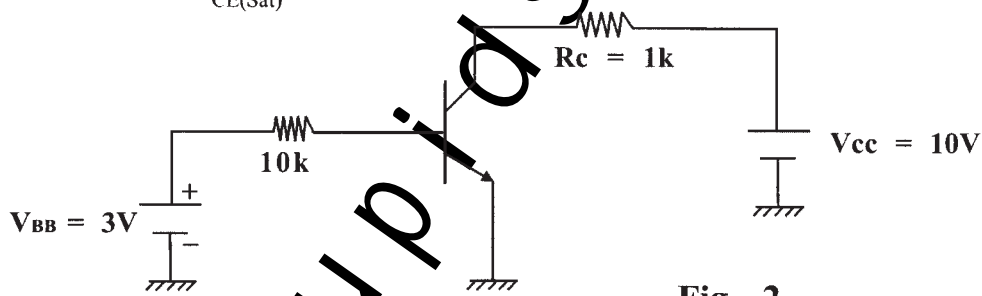(B) Determine whether or not the transistor in fig. 2 is in saturation. Assume $V_{CE(Sat)}$ = 0.2V. [08]

Fig. 2

OR

Q.4) (A) When is the channel of a JFET is said to be pinched off ? Define pinch off voltage. Give relationship between the pinch off voltage, the saturation current and the gate to source voltage. Draw drain characteristics of n-channel JFET. [08]

(B) Show structure and circuit representation of a silicon controlled rectifier. Explain its principle of operation. Draw V-I characteristics. Define holding and latching current. [08]

Q.5) (A) Describe use of an Op-Amp as adder. What type of feedback is used in an Op-Amp adder ? Justify your answer. [06]

(B) Draw block diagram of Op-Amp. [04]

(C) Draw neat diagram of basic differentiator. Give its limitations. How they are overcome in practical differentiator. [08]

OR

Q.6) **(A)** What is meant by V-I Converter. Draw circuit diagram of V-I Converter using floating load and mention use of this circuit. **[08]**

(B) State characteristics of an ideal Op-Amp. A certain Op-Amp has an open loop gain of 1,00,000 and a common mode gain of 0.2. Determine CMRR and express in dB. **[04]**

(C) Find output voltage V_o of the Op-Amp circuit shown in fig. 3. **[06]**
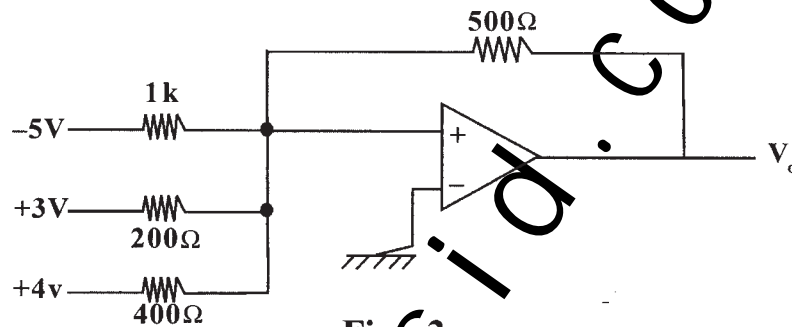

Fig. 3

SECTION - II

Q.7) **(A)** A burglar alarm should activate when two conditions given below are simultaneously satisfied.

(a) the main entrance door of the building is open, and

(b) the bedroom door and/or the kitchen door is open.

Write truth table and construct logic circuit to operate alarm using one AND gate and one OR gate. **[06]**

(B) What is a Shift Resistor ? Explain operation of a 4-bit shift resistor with serial-in, serial-out data. **[06]**

(C) How does a Micro-processor differ from a Micro-controller ? Explain importance of Micro-processor. **[04]**

OR

Q.8) **(A)** Synchronous Counters are more advantageous than Asynchronous Counters. Explain. Describe in brief some important applications of Counters. **[04]**

(B) Give CMOS Implementation of : **[06]**

(a) AND Gate

(b) OR Gate

(C)   The boolean expressions of the two variables X and Y in terms of the three input A, B and C are given by :

$$X = ABC + A\overline{B}\overline{C} + \overline{A}B\overline{C}$$

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

Write relationship between X and Y.   **[06]**

Q.9) (A)   Give classification of Controllers. Explain advantages and disadvantages of each.   **[06]**

    (B)   Compare different types of Temperature Transducers.   **[06]**

    (C)   Draw and explain Two-wire Transmitter.   **[04]**

OR

Q.10) (A)   Draw block diagram of PLC and explain various blocks.   **[06]**

    (B)   Explain principle and operation and working of Displacement Transducer.   **[06]**

    (C)   Mention factors to be considered while selecting a tranducer for an application.   **[04]**

Q.11) (A)   (a)   What is the difference between Analog Communication and Digital Communication ? Mention advantages of Digital Communication.   **[04]**

          (b)   Write a short note on RG Standard for Co-axial Cables.   **[02]**

    (B)   A carrier frequency of 200 kHz is modulated by a sinusoidal wave with a frequency of 25 kHz by standard amplitude modulator. Determine Output Frequency Spectrum. Calculate Band Width.   **[06]**

    (C)   Draw basic block diagram of Superhetrodyne Receiver and explain function of each block.   **[06]**

Q.12) (A)   An audio frequency signal $10 \sin 2\pi 500t$ is used to amplitude modulate a carrier of $50 \sin 2\pi \times 10^5$, calculate :

          (a)   Modulation Index

          (b)   Side Band Frequencies

          (c)   Amplitude of each Side Band Frequency   **[06]**

    (B)   (a)   What are the main sections of an Optical Fiber ? Explain function of each section.   **[03]**

          (b)   Explain problems associated with Twisted Pair Cables. State different types of Twisted Pair Cables.   **[03]**

    (C)   Explain with diagram the working of Cellular Telephone System.   **[06]**