

Total No. of Questions : 12]

[Total No. of Printed Pages : 4

**[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.

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**SECTION - I**

- Q.1)** (A) The reverse saturation current at 300°K of a P-N junction Ge diode is  $5\mu\text{A}$ . 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  $160 \sin [2\pi (60)t]$  V. Assume  $V_r = 0.7\text{V}$  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  $I_{z1} = 49mA$ ,  $I_{zk} = 1mA$ ,  $Z_z = 7\Omega$  and  $I_{zm} = 70 mA$ . Determine minimum and maximum input voltage that can be regulated. [10]

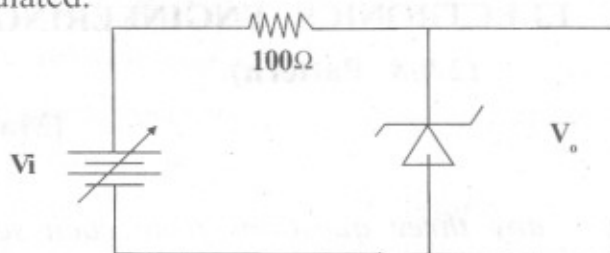


Fig. 1

- 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]

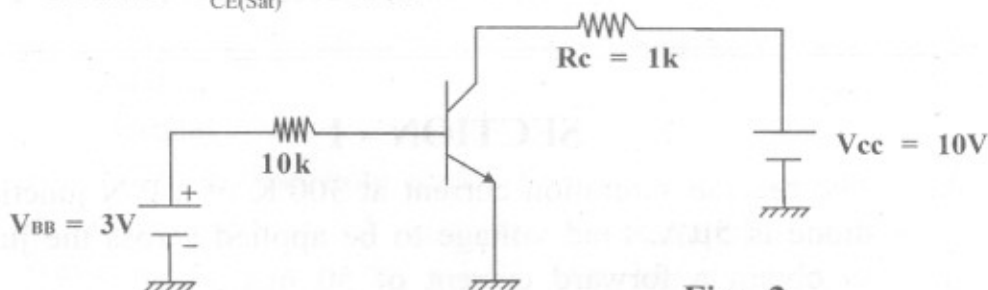


Fig. 2

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]

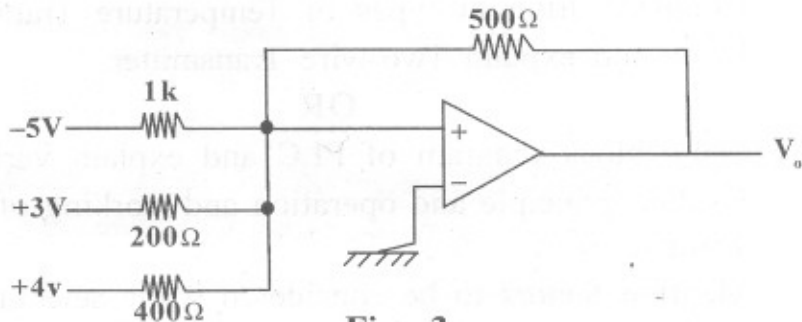


Fig. 3

## 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 :

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

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

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 transducer 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 1200 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]